Investigating the Current State of the Art on Ethics Reviews of Information and Communications Technology Research in UK Universities

By

Eke Damian Okaibedi

Centre for Computing and Social Responsibility

Faculty of Technology

De Montfort University, United Kingdom

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ABSTRACT

Information and Communications Technology (ICT) is a concept that represents the convergence of some defining technologies of our time (Information technology, computer technology and media technology) and the increasing influences its research and usage have on the society today. With such distinctive features as pervasiveness, ubiquity, malleability, interactivity, augmentation, autonomy and virtualization, ICT research and usage provides an array of ethical and social challenges. However, most contemporary research on ICT ethics concentrates only either on the usage of ICT artefacts or on questions that raise significant theoretical or practical interest such as ICT implants or eHealth. There has been little research on the ethical and social issues associated with research and development of ICTs. This research draws the attention back to the beginning - research and development. It seeks to find out how ethical issues are considered in ICT research being carried out in the UK computing departments/faculties. It investigates the current state of the art with regard to ethics reviews of ICT research through establishing its relevance, availability and effectiveness. The fact that high quality researches (including European projects) in ICT are currently being carried out in so many UK computing departments, which also produce engineers for IT companies, justifies the choice of the UK in this research. Even though a questionnaire was used as part of the data collection methods, the interpretive, qualitative and subjective nature of this research finds reference in the use of interviews for the main data collection and dialectical hermeneutics for data analysis. Through a dialectical hermeneutic process, different understandings on the availability, relevance and effectiveness of ethics reviews of ICT research emerged. These understandings showed the strengths and weaknesses of the current ethics review

procedures in the UK computing departments which provided the basis for relevant recommendations to policy makers.

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ABBREVIATIONS

BCS – British Computer Society

CIPPIC – The Canadian Internet Policy and Public Interest Clinic

DIODE – *Define, Issues, Options, Decision and Explanation*

EC – European Commission

EGE – European Group on Ethics

EIS – Europe's Information Society

ER – Ethics Reviews

ERP – Ethics Review Procedures

ERB – Ethics Review Board

ESRC – Economic and Social Research Council

ETICA - Ethical Issues of Emerging ICT Applications

EU – European Union

FHI – Family Health International

HEA – Higher Education Academy of the UK

HEFCE- Higher Education Funding Council for England

HSE – Health and Safety Executive

ICO – Information Commissioners Office

ICT- Information and Communication Technology

ICT4D – Information and Communications Technology for Development

IEEE – Institute of Electrical and Electronics Engineers

IPTS – The Institute for Prospective Technological Studies

IS – Information Systems

IT – Information Technology

NATO – North Atlantic Treaty Organization

OPC- Office of the Privacy Commissioner

ORI – The Office of Research Integrity

RCN – Royal college of Nursing

UK - United Kingdom

UKRIO – UK Research Integrity Office

WCED - World Commission on Environment and Development

WHO – World Health Organization

WIPO – World Intellectual property organization

WMA – World Medical Association

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

There has been a great deal of research in the area of Information and Communications Technology (ICT) over the last few decades. Such research has blossomed to the benefits of businesses, individuals and public services which have led to significant social, economic and legal changes. Many aspects of human life have been altered: commerce, employment, medicine, security, transportation and entertainment. In essence ICT is having increasingly huge impacts on our society and also providing an increasing array of ethical and social challenges which give rise to social policy vacuums (Moor, 1985). However, there has been a continued concentration on the technical issues involved in ICT research while less attention has been paid to the development of guidelines that address the moral issues inherent in such research. For instance, the level of research in ICT development has indeed outpaced ethical developments in this area (Moor & Bynum, 2002). There is need for decisions to be taken, ethical problems to be considered, legislation to be adopted and ethical frameworks to be formulated and implemented (Floridi, 2006).

Following on the heels of research in medicine, scientific disciplines (such as biotechnology, pharmaceuticals, psychology) along with many social scientific fields of inquiry, have promoted their own guidelines for ethical research. The ethical guidelines promoted by the European Group on Ethics (EGE) and the Economic and Social Research Council (ESRC) in the UK demonstrate the increasing importance of ethical issues related to research in scientific disciplines and social sciences. In ICT, there are

some reactions because most organisations, whether publicly funded or in the private sector, have developed guidelines, that promote the proper use of their ICT resources (Bissett, 2005). The UK Research Integrity Office (UKRIO) established in 2006 has encouraged all funding bodies to demand for a publicly promulgated research ethics policy from institutions and research institutes. Today, many funding bodies in the UK such as the Wellcome Trust together with the Higher Education funding Council for England (HEFCE) and the ESRC have started demanding the consideration of the human consequences of computer systems (HEA, 2008).

ICT provides a good and valuable vehicle for research in many fields and is also a rich area for research in its own right (Bissett, 2005); however, there remains a gap in policies or guidelines on how to carry out ICT research ethically. The nature of ICT research and development leaves ICT with distinct problems such as; the distancing effect of technologies which may encourage unethical behaviours (Bissett, 2005); hazards such as the self-inflicted attack by North Atlantic Treaty Organization's (NATO) anti-virus experimenters (Nathan, 2000), constant invasion of people's privacy and so many unintended consequences (Moor & Weckert, 2004). Thus, one can say that ICT research gives rise to varying levels of serious ethical problems and therefore requires an adequate regulatory model. To underscore this point, the European Commission has made it mandatory that all ICT research under its 7th framework programme should comply with certain ethical standards so as to ensure that scientific and technological development happens with a framework of fundamental ethical principles and on the basis of agreed practices that can inspire the rest of the world (ERA, 2007). The European Commission has funded several projects on ethical issues such as; *Homeland Security, Biometric Identification & Personal Detection Ethics*

(HIDE), *Privacy in Research Ethics and Law* (PRIVIREAL) and *Privacy in law, ethics and genetic data* (PRIVILEGED). They have also funded a three year project titled; *Ethical Issues of Emerging ICT Applications* (ETICA) which was aimed at identifying the ethical issues that can be associated with emerging ICTs. These projects indicate the Commission's commitment to the incorporation of ethics in research, development and application of ICT products. Also, on this note, the Higher Education Academy of UK (HEA) agreed to fund part of this project to investigate the current state of the art with regard to ethics reviews of ICT research projects in the UK universities particularly in the computing departments/faculties. This project seeks to establish the relevance and availability of ethics reviews procedures in these universities and also the effectiveness of whatever procedures that are available.

1.2 Research Motivation

Despite the huge strides ICT has made in the society today, there are promises of more in the near future with emerging technologies such as affective computing, ambient intelligence, artificial intelligence, bioelectronics, cloud computing, future internet, human-machine symbiosis, neuroelectronics, quantum computing, robotics and virtual/augmented reality. These socio-technical systems have the potential to affect significantly the way humans interact in and with the world. Both researchers and funding bodies are working hard for the success of these developments. Some of these researches take place in UK universities but as revealed in 1.1, there are little developments of ethical guidance for them. Therefore, there is a need to explore the challenges this presents to researchers and the current state of the art from the perspectives of ICT researchers in all departments in the UK universities especially in the computing departments/faculty. This is because even though many ICT researches

today are trans-disciplinary, computing departments or faculties should provide the structure for ethics reviews of all ICT research.

Most contemporary researches on ICT ethics concentrate either on the usage of ICT artefacts or on questions that raise significant theoretical or practical interest such as ICT implant or eHealth (Ikonen et al, 2009). The UK scholars and researchers, such as Rogerson (1998), Floridi (1999;2002) and Stahl (2004) have all written about one or both of these issues. Also American scholars, like Bynum & Schubert (1997), Gotterbarn (1999), Tavani (2003), and Australians Moor (1985) and Weckert (2002), have generated an extensive literature on the ethics of current ICT applications which have inspired lots of past and current research across computing departments in so many countries. There is little research however on the ethical and social issues associated with research and development of ICTs. The EU Etica project which started a year after this research is one of a few recent research programmes in this area. This present research is an attempt to fill this gap in the UK by concentrating on ethical and social issues in ICT research through a study on the ethics reviews of such research projects.

Third, while the literature on ICT reveals that the consideration of ethical issues in ICT research is important, opinions on the relevance of ethics and especially ethics reviews are divided among ICT researchers in the UK. Understanding the different views of such researchers on the relevance of considering ethical issues in conducting research is vital to understanding the attitudes towards research in general and this research in particular. The need to contribute to the filling of this knowledge gap in the UK was also a motivating factor in conducting this research.

1.3 Research Questions

The main research question is: ***What is the current state of the art in ethics reviews of ICT research projects in UK Universities?*** And in order to answer this question, these sub questions will also need to be answered.

a. What is ethics review?

b. What is the relevance of ethics reviews in ICT research?

c. What ethics review procedures currently exist in ICT research in the UK and how suitable are they?

d. Are the current ethics reviews procedures for ICT research in the UK universities (especially the computing departments/faculties) effective and how can they be made more effective?

Questions b, c and d revolve around the identified themes of this research which are discussed in sections 4.2.4 and 4.3.3.

1.4 Research Objectives

Based on the above motivations, the objectives of this research are;

1. To identify the current state of the art in ethics reviews of ICT projects in UK computing departments/faculties, by exploring the relevance of ethics review procedures to ICT researchers in the UK universities, determining the availability and perceived effectiveness of such procedures.

2. To explore the meaning of ethics review through a review of available literature.

3. To contribute to any existing body of knowledge on the ethical issues associated with the research and development of information and communications technologies.

4. To provide ICT researchers and policy makers with recommendations on how the development and implementation of ethics reviews frameworks can be made more effective in UK universities for both staff and students.

1.5 Thesis Structure

This thesis is divided into eight chapters to ensure a clear presentation of the logic and arguments put forward. This first chapter presented the introduction to this research, which includes the background to the research, the rationale for conducting the research, the research objectives and the specific questions the research is intended to provide answers to. It identifies the important academic contributions resulting from the research.

An extensive review of available literature on ethics reviews of ICT research is presented in Chapter Two. It starts with conceptual clarifications of ICT, ethics and ethics reviews which enable a theoretical and practical understanding of ethics reviews in ICT research. It provided discussions on the distinctive features of ICT and reviews the literature on the relationship between ICT research and usage. It also presents discussions on the identified ethical issues associated with ICT research and the extent of the legal and ethical framework currently guiding ICT research in UK universities.

Chapter Three describes and justifies the philosophies and methodology adopted in this research. To help the reader to clearly understand the chosen paradigm (which is

interpretive paradigm) and methods (questionnaire, interview and dialectical hermeneutics), there were detailed discussions on research ontology and epistemology in ICT which culminated in presenting justifications for the choices made. It also provided an overview of different research methods for both data collection and data analysis that are used in ICT research.

Chapter Four then focuses on an elaborate discussion on hermeneutics; the chosen method of qualitative data analysis. Due to the fact that hermeneutics is a relatively new method for ICT research, the discussion starts with a brief history and definition. It also presents the different ways this method has been applied in ICT research so far and concludes with a detailed overview of how it was applied in the analysis of the data collected with the interviews.

The process by which the quantitative and qualitative data were collected is presented in Chapter Five. It presents the procedures for the selection of participants for both the questionnaire and the interviews; the process of distributing the questionnaire and the demographic statistics of the participants.

Chapter Six provides an analysis of the quantitative data collected through the questionnaire. It started with a brief explanation of the data analysis method - confidence interval estimation and continued with the confident estimation of the proportion of actual population with the sample data on availability, relevance and effectiveness of ethics reviews in the UK universities.

Chapter Seven provides an analysis of the qualitative data from the interviews on the relevance, availability and effectiveness of ethics review procedures for ICT research in UK universities. It presented the hermeneutic dialectic that emerged from the

perspectives of the participants in ICT departments/faculties as well as a participant from the medical sciences. These perspectives or *horizons* culminated in certain syntheses or *fusions of horizons* presented towards the end of the chapter.

Finally, Chapter Eight provides critical discussions on the findings which helped the researcher to draw some implications; make comparisons between prior literature and the findings; evaluate the whole research and highlight its limitations. It also presents the theoretical and practical contributions of the research while making suggestions for future research.

CHAPTER TWO

OVERVIEW OF RELEVANT LITERATURE

Introduction

This chapter offers a critical review of the existing literature in the area of ethics reviews of ICT research. In order to avoid some conceptual muddles or misunderstandings, key concepts which include ICT, ethics and research ethics are defined within the context of this research. Importantly, the relationship between ethics and ICT is established, providing a solid foundation for understanding the ethics reviews of ICT research projects. Finally, this chapter identifies the important gap in the literature, this research aims to fill.

2.1 ICT Defined

The letters ICT form an acronym that stands for Information and Communications Technology. To define this concept, it is important to understand the three component words that make it up; **Information, Communications, and Technology.** Many of us have either an assumption or a pre-theoretical idea of what these terms mean. It is however, useful to analyse them academically, because these assumptions might not withstand the strong logical analysis. Clarifications of these terms will enable a structured discourse. Subsequent paragraphs will then offer descriptions of what these words mean.

Information: Etymologically, this word comes from the Latin verb *informare* which means to shape, tell or to give form to. This connotes an imposition of structure upon some indeterminate mass (Sveiby, 1998). However, from our daily life usage to a

technical realm, information has a diversity of meanings owing to the fact that it has 'reached a level of ubiquity' (Stahl, 2004). It has acquired a plethora of different analyses which generate a lot of confusion, misunderstandings and misuses (Floridi, 2011). To avoid such confusion, only adequate general meanings and contextual meanings will be offered here.

Generally speaking, information refers to knowledge acquired through study, experience or instruction which is given and/or probably received. *Encarta World English Dictionary* (1999 p.963) offers three definitions of information as;

1. *Knowledge acquired or supplied about something or somebody.*
2. *Collected facts and data about a specific subject and*
3. *The communication of facts and knowledge.*

The above meanings of information as both facts and communication are inherent in foundations of Norbert Wiener's information theory in his work *Cybernetics or Control and Communication in the Animal and the Machine.* Sveiby (1998) pointed out, two different ideas of information as asserted by Wiener (1948) and Shannon (1948). According to Wiener, information is attached to issues of decisions, communication and control. This is different from Shannon's concept of information as purely a quantitative measure of communicative exchanges (Sveiby, 1998; Gitt, 1996). According to Gitt (1996), information according to Shannon does not relate to the qualitative nature of the data, but confines itself to one particular aspect that is of special significance for its technological transmission and storage. These two definitions have influenced a lot of information theorists in different disciplines especially in computing. However, for this research, information comprises knowledge of facts and data that can be communicated, which can be found in both views above.

Communication: Oxford English Dictionary defines this as the imparting, conveying, or exchange of ideas, knowledge, and information. It therefore involves any activity aimed at conveying feeling or any other information from one person to at least another person. In everyday life, this act of conveying is done through spoken or written language, facial expressions and most often gestures. All of these are skills we learn either by personal observations or directly through education and by practising them. Therefore, communication can be referred to as a learned skill (Maguire & Pitceathly, 2002).

Technology: Just like information above, technology has a diversity of meanings. It comes from two Greek words; *techne* which means craft or art and *logos* meaning a saying or an expression (Hart & Kim, 2000). This etymology literarily means that technology is a discourse on craft or an articulation of art. In today's literature, technology involves the use of scientific knowledge to produce artefacts that improve capabilities - human, animal, environmental etc. However, there is more to technology than just artefacts. Many scholars have suggested that actions based (either individual actions or community actions) on these artefacts can also define technology (Stahl, 2004). Others offer a definition that completely neglects the artefact side of technology. These later scholars emphasize the 'inherent rationality' involved in technology rather than the object side of it (Stahl, 2004).

Another scholar (Hauptman, 1999) offers a classical definition of technology as ''applied science; the use of a discovery in order to find a better tool to make life easier, safer, or better. As science asks 'why?', technology asks 'how?''. This is a definition

that highlights the close relationship between science and technology – theory and practice (Stahl, 2004).

ICT

The above analysis of the constituent aspects of ICT demonstrates the complexity and importance of this concept and can lead us to a variety of definitions. But for the purpose of this project, there will be concentration on a definition that best describes its usage in this report. This takes into account both the object side of technology (e.g the artefacts and the usage) and the rationality behind their development (the methods of developing these artefacts - research). By doing so, the technology itself and its research (which is the thrust of this project) are highlighted. In this research therefore, notions of knowledge, process, objects and their usage are incorporated in the ICT definition. Emphasizing only one of these aspects of the concept will constitute a misrepresentation.

Literarily, ICT will then mean the *communication* of *information* through *technological* artefacts. However, from the above explanations, ICT can be defined by the researcher as a concept that involves the **production** and **usage** of scientific artefacts which can be used to convey or exchange information in different ways. Examples of such artefacts include computers (pcs, macs etc), satellite systems digital television, mobile phones, radio, network systems, robots and various other hardware and software systems. Basic characteristics of these ICT products include information retrieval, storage, processing, communication, manipulation and receipt.

The above explanation can find reference in Toomey (2001, p.3) who defined it as;

> ... those technologies that are used for accessing, gathering, manipulating and presenting or communicating information. The technologies could include hardware (e.g. computers and other devices); software applications; and connectivity (e.g. access to the Internet, local networking infrastructure, videoconferencing)

This is a concept that has blurred the lines between information technology, computer technology and media technology. Technically, ICT represents the increasing convergence of different defining technologies of our time and the rapid change that characterises both the technologies and their use (Toomey, 2001, p.3).

ICT is a concept that has been promoted strongly by the European Union (EU) and has been used so much in education within Europe. However, despite the huge role this concept plays in Europe it does not appear to have permeated the US computing parlance. The EU is indeed one of the foremost, if not the strongest, proponent of the ICT concept. The evidence of this is in the fact that, ‘‘the ICT sector is worth 6-8% of the EU’s GDP’’ (EIS, 2011). As at 2006, ICT employs about 6% of the EU workforce and continues to drive about half of EU productivity gains in the private sector (EU Task-Force on ICT, 2006). A total of 9.1billion Euros have been earmarked by EU member states for the funding of ICT projects in their 7th Research Framework Programme (2007 to 2013) making it one of the most important sectors for the future. So far, over 726 projects have benefited from this budget (EC, 2011).

However, its importance goes well beyond the above evidence and lies not in the technology itself but in ICT’s ability to create greater access to information and communication in underserved populations of Europe. ICTs are critical to improve the competitiveness of European industry and to meet the demands of its society and

economy. The European Union understands this and has taken ICT as the very core of the knowledge based society and ultimately hopes to transform ICT progress into benefits for Europe's citizens, industry, businesses and governments.

Internationally, the United Nations (UN) has actively promoted this concept through its Information and Communications Technology for Development (ICT4D) programme as a means of bridging the digital divide between developed and developing countries (the disparity between technological *haves* and *havenots* geographic locations or demographic groups). This initiative promotes ICT as a powerful tool for providing developing countries with unprecedented opportunities to achieve relevant development goals which include poverty reduction, basic health care, and education, more effectively than before.

However, despite the constant usage of this acronym, no universally accepted definition has appeared. The reasons behind this might be that;

1. The logical operations in the development of the technology, the concept, applications and methods involved in ICT are constantly evolving.
2. The concept is a relatively new one and therefore seeks a standard definition. or
3. It is a concept that can, and has, defied universal understanding.

The first reason seems most plausible (Moor, 1985). This is a concept that has blurred the lines between Information technology, computer technology and media technology. Technically therefore, ICT represents the convergence of these three defining technologies of our time that originally operated largely independent of one another. This convergence has provided such opportunities as increased market competition, emergence of new and multi-tasking services and applications that are convenient and simple to use. It has also presented us with new challenges like the need for new

regulatory frameworks and the issues of privacy, security and reliability. In support of the above theory on convergence, ICT has been conceived in Mexico,

> as the result of a technological convergence between telecommunications, computer sciences, microelectronic, certain administration ideas and the management of information that has evolved in almost half a century. Hardware, software, services and telecommunications are considered as its components (United Nations ICT Task Force, 2005, p. 138)

Also in Colombia, another definition of this concept has emerged. It is defined as

> … the set of instruments, tools, and communication means like phones, computers, electronic mail and the Internet that allow the communication between persons and organizations (United Nations ICT Task Force, 2005, p. 138)

This definition emphasizes the artefacts associated with the concept of ICT. However, no matter from what perspective ICT is defined, it highlights the ever increasing convergence of information technology, computer technology and media technology. This captures an important shift in scientific research/production and represents something more encompassing than earlier concepts like Information Systems (IS) and Information Technology.

In the UK, ICT generally refers to a subject in school's curriculum that was introduced as a result of a government initiative (National Grid for Learning) launched in 1998 (Somekh, 2003). This subject is aimed at equipping school-leavers with a good

understanding of ICT (including computers and the internet), with measures in place for assessing their competence and also improving their learning through the use of ICT facilities (Ofsted, 2002). In this research, ICT is taken to be much more than this [see section 2.1.1]

2.1.1 ICT, IT and IS

The general use of the concept ICT is connected with classical definitions of the term Information technology (IT) as ‘‘the tangible means by which information is manipulated and carried to its ultimate users’’ (Mason et al, 1995 p. 80). For many, these two terms (ICT and IT) are one and the same.

However, there are quite a few distinguishing factors between them such as;

1. IT is largely used in the United States while ICT enjoy a massive following in Europe

2. While the aspect of communication is implied in the term information technology, ICT tries to lay emphasize on it.

3. The concept of IT concentrates on the physical artefacts more than the usage.

Thus, Lloyd (2005) asserts that ICT is an evolution from IT. ICT offers a broader dimension to a narrowly defined concept – IT. The researcher then argues that the acronym ICT captures the ideas portrayed in this research more than IT.

Another concept related to ICT is Information Systems (IS). IS refers to the software and hardware systems together with the personnel and activities that support the intensive applications of data in business. Stahl (2004, p.6) posits that IS demonstrates

‘‘the attempt to use new technologies for the purpose of business’’. He goes further to suggest that its basic purpose is the pursuit of wealth, security, recreation, entertainment, and control. Therefore, IS finds meaning in organizations which usually refers to businesses. This business end of IS differentiates it from the idea of ICT in this research. Here, even though the definition of ICT includes its usage both in government and in business, it does not emphasise it to the level of downplaying the development of the artefacts.

The choice of this concept ICT in this research is therefore informed by the above distinguishing factors between ICT, IT and IS. Basically, ICT represents the area of interest of the researcher more than IT and IS. It includes both IT and IS and owing to the fact that this research is being conducted in UK it fits the context more than IT and IS.

2.1.2 Features of ICT

As a product, application, project or service, ICT has defining features that present its uniqueness. This section will discuss a subset of identified features of ICT. These will include some of its characteristics discussed in available literature. These features account for the unique amplifications of old ethical questions in ICT.

2.1.2.1 Pervasiveness and ubiquity

In the ICT literature, pervasiveness and ubiquity are main features of ICT pointed out by scholars such as Weiser (1991) Kietzmann & Sørensen (2010) McCullough (2004), Fleisch (2010) and Horrocks (2007). MSN Encarta dictionary defines ‘pervasiveness’ as ‘‘**present everywhere:** spreading widely or present throughout something’’ and ‘ubiquity’ as ‘‘**existing everywhere:** present everywhere at once, or seeming to be’’.

This means that ICT is spreading widely and presently seems to be in existence everywhere.

The coinage of the term *ubiquitous technology* is attributed to Mark Weiser who wrote that

> … the vision of laptop machines, dynabooks and ‘‘knowledge navigators’’ is only a transitional step toward achieving the real potential of information technology. Such machines cannot truly make computing an integral, invisible part of the way people live their lives. Therefore we are trying to conceive a new way of thinking about computers in the world, one that takes into account the natural human environment and allows the computers themselves to vanish into the background (Weiser, 1991, p.94)

Currently, this description has been used synonymously with the term pervasive computing. The introduction to the Institute of Electrical and Electronics Engineers' (IEEE) Pervasive Computing journal puts it this way; 'the essence of this vision is the creation of environments saturated with computing and wireless communication, yet gracefully integrated with human users''(IEEE, 2005). The above visions present two understandings. One, the understanding of ‘‘computers everywhere’’ in use today and secondly, a deeper vision of computing devices that are today weaving ‘‘themselves into the fabric of everyday life until they are indistinguishable from it’’ (Weiser, 1991, p1).

There are multiple examples of pervasive and ubiquitous ICT products, applications, projects and services available today. These include wireless and mobile networking,

wearable and location aware computing and future internet (Rheingold, 2002; Shabajee, 2005). Owing to the pervasiveness of these ubiquitous ICT products, there are growing concerns about security, privacy and some medical issues.

2.1.2.2 Malleability

It was James H. Moor (1985; 2001) who first described computers as machines that are logically malleable. This means that we can adjust their functionality almost without limit (Moor, 2001). According to this description, computers are presented as unique, powerful and flexible. Therefore, they are the 'ultimate useful machines' that are universal tools.

In Moor's theory, logical malleability enables ICT to make possible many things that were not previously possible. Also the widespread nature of computers presents us with novel opportunities of adjusting its functionality or usefulness. Applications of computing devices are then limitless and can be found in places we do not expect them (Moor, 2001). This ability to program a computer to do anything you want it to do raises huge concerns which can be ethical, social or legal.

2.1.2.3 Interactivity

In 1960 Licklider advocated the building of computers capable of working symbiotically with humans. Since then, many of the visions around this concept have been achieved (Foster, 2007). This has seen the increase in human-machine symbiosis. One of the major defining characteristics of this human-machine symbiosis is that of interaction. For humans and machines to mutually work together and be effective, in for instance brain-computer interaction and/or in performing other highly challenging activities, interactivity is central to the technology (Ikonen et al, 2010).

Interaction between the brain and the technology is made possible with machine sensory perceptions. Technologies like robots can then be cognizant of and execute a user's needs. Kurzweil (2000) commented on how in the future neural implants will provide a range of sensory perceptions and sensations when the implants interact with virtual environments. These and many more interactions between humans and ICT have the possibility of raising ethical questions.

2.1.2.4 Miniaturization

This is a feature evident in today's ICT products. Over the last two decades, the sizes of produced artefacts are getting smaller, cheaper and more powerful. And given the malleability of ICTs, researchers studying microelectronics, nanoelectronics and other emerging technologies are continuing to push the frontiers, creating knowledge needed to continue the progress of miniaturization. Smaller and smaller electronic sensors including biological ones with novel and diverse applications are increasingly created (U.S. Congress, 1991). This, among other things, makes practical invisibility possible (Bohn et al., 2005). In the near future, it will no longer be easy to see how and for what technology is utilized in particular contexts. Moreover, as more technology become hidden part of our lives, it will be become even more opaque to users and ethical issues such as privacy, security and surveillance will become more exacerbated (Chen, 2002).

2.1.2.5 Embeddedness

Many variations of the word 'embed' exist. But for the purposes of this research, it will be taken as to cause to be an integral part of a surrounding whole. Owing to the accelerated evolution of ubiquitous computers, ICT has become embedded in our natural movements and interactions with our environments – both physical and social

(Lyytinen & Yoo, 2002). The UK Parliamentary office of Science and Technology (POST) in 2006 asserted that eight billion embedded microprocessors are produced each year. This makes computing devices more pervasive thereby increasing the challenging ethical and social issues they raise. Even though it relates to ubiquitous and pervasive computing, it is a unique feature that defines the present and future ICT.

2.1.2.6 Augmentation

Another feature that emerges from the human-machine symbiosis is augmentation. Licklider's (1960) idea (of human-machine symbiosis) hinges on the fact that human intellect can be augmented to perform tasks beyond its natural limitations. Thus, De Greef et al (2007, p1) argue that, the aim of the human-machine symbiosis is "the creation of adaptive human-machine collaboration that continually optimizes performance of the human-machine system". This means that the increasing interaction between humans and ICT machines offers us the distinctive ability to augment our intellectual limitations such as memory and vision.

2.1.2.7 Autonomy (Independence)

Another feature that characterizes some ICT products is autonomy which means that they are built in such way that they can work independently or without direct human supervision. Examples of this are robots. They can be programmed to work based on their perceptions without direct human intervention. This concept has become widely used in robotics and artificial intelligence (Smithers, 1997; Nourbakhsh et al, 2005). Terms, such as 'autonomous robots', 'autonomous agents' and 'autonomous systems', are commonly used in ICT literature today. However, some authors believe this usage of autonomy is weak and unsatisfactory because robots or systems can work

independently and sometimes freely but the goals they can achieve are set by human beings (Smithers, 1997; Haselager, 2005). Their argument rests on the fact that autonomy is deeply connected with capacity to act out of one's own choices which robots are not able to. In this research, autonomy is taken to mean ICT products working independently and freely which raises ethical questions such as; who is culpable if independent robots inflict harm?

2.1.2.8 Virtualization

The word virtual can be understood in different ways but in computing, it is referred to as the simulation of reality through the use of a computer (Douglas, 2010). It is used for things, activities, and organizations that are realized or carried out in an electronic/computing medium. Examples include virtual storage, virtual images and also virtual interaction.

Virtualization therefore is the creation of a virtual (as against actual) version of things or activities such as an operating system, a storage device or network resources. This is another important distinctive feature of ICT. It has the capacity and ability of virtualization. Cloud computing provides an evidence of the increasing amount of virtual ICT resources available today. Like other features virtualization amplifies old ethical questions such as privacy and control because it creates new possibilities of accessing personal data stored in facilities one has no full control of. Also with the advent of cyber communities involved in virtual education, virtual friendship and virtual organizations, this feature has a distancing effect on human interaction (Moghaddam, 2006).

Implications

There are huge existing and potential implications of the above mentioned features which are both positive and negative. The positives - which include the huge benefits they afford us - have been extensively discussed by various scholars (Keyani & Hong, 2005; Ramchand et al, 2005; Strassner & Schoch, 2002). These features ensure that ICTs offer us increasing access to huge amounts of information and services, cheaper and more reliable communication, new opportunities for leisure and entertainment, and also for improving our healthcare services. However, negative impacts such as reduced physical interaction, privacy problems, digital divide and security issues can be attributed to ICTs features (Stahl, 2011; Weckert, 2002).

The defining features of ICT outlined above give rise to these impacts which are both positive and negative. For instance, a feature such as logical malleability makes the potential applications of ICT appear limitless because its logic applies everywhere (Moor, 1985).

However, in a distinctive way similar to no other discipline, ICT research and development gives new twists to existing research ethics issues such as privacy and intellectual property rights owing to the above features of the developed artefacts. For instance, research into deep brain stimulation that can reveal the neural correlates of our innermost thoughts and unconscious attitudes will raise new questions on privacy (Fuchs, 2006). Even though the issue of privacy is not a new one, this will raise novel issues on privacy. The increasing research into the use of nano technology in computing promises faster, smaller and lighter or molecule sized computers that will have huge impacts on the society including raising multiple unique ethical problems of privacy. Also, the increasing research into robotics raises ethical questions of personhood and moral agency [see section 2.6.1.3] which are not commonly discussed in the literature

on ICT research. Among the features of such technologies that necessitate these issues include, pervasiveness and ubiquity, autonomy, embeddedness and interactivity. ICT's unique features thus pose new versions of old moral problems or amplify standard moral dilemmas necessitating the application of moral norms in different new ways (Johnson, 1985). One way of addressing this would be through a specific Ethics Review Procedures (ERPs) that will take into consideration the specific ethical twists involved. The adoption of procedures will then be an acknowledgement; - that the technologies are produced for the society and, when embedded in the society have serious impacts; that these impacts can be managed at a much earlier stage which is the stage of research and development. However, to understand and appreciate the ethical issues related to ICT research, ICT researchers need to understand what ethics is.

2.2 Ethics Defined

Ethics is derived from the Greek word *ēthikos* which means customs (Singer, 1994). It denotes a branch of philosophy that has its roots in the works of Plato, Socrates, Aristotle and other early Greek philosophers. Ethics is concerned with judgements on the rightness and the wrongness of human action. However, in general parlance, it refers to customs or principles that guide a person or a group of persons. Singer (1994, p.4) thus wrote;

> The word itself is sometimes used to refer to the set of rules, principles, or ways of thinking that guide or claim authority to guide, the actions of a particular group; and sometimes it stands for the systematic study of reasoning about how we ought to act.

As a branch of philosophy, ethics is usually called moral philosophy (MacKinnon, 2004). This is because according to Webster's Dictionary, the philosopher Cicero (106-43 BC) translated *ēthikos* into Latin as *moralis* (customary or moral). Morality and ethics thus became synonymous in their original usage. However, their usages today have drifted slightly. For Singer (1994, p.5),

> Morality brings with it a particular, and sometimes inappropriate, resonance today. It suggests a stern set of duties that require us to subordinate our natural desires- and our sexual desires get particular emphasis here- in order to obey the moral law. A failure to fulfil our duty brings with it a heavy sense of guilt. Very often, morality is assumed to have a religious basis.

It is common to hear people associate ethics with feelings, religion, law or what the society accepts. Some religions advocate high ethical standards and some laws incorporate ethical standards. However, ethics can neither be confined to religion nor law, because if it is, ethics should only apply to religious people and law can, and most times deviate from what is ethical (Velasquez et al, 1987). Therefore, 'feelings', 'religion', 'law' or even 'what society accepts' cannot adequately define ethics. What then is ethics?

Ethics are moral standards that help guide behaviour, actions, and choices. Ethics is grounded in the notion of responsibility and accountability (Laudon & Laudon, 1996). Velasquez et al (1987, p.1), lend credence to this view by referring to ethics as a ''well based standards of right and wrong that prescribe what humans ought to do, usually in terms of rights, obligations, benefits to society, fairness, or specific virtues''. Their

reference to standards points to principles that impose the reasonable obligations to refrain from rape, stealing, murder, assault, slander, and fraud; standards that enjoin virtues of honesty; standards relating to rights, such as the right to life and the right to privacy - standards that are supported by consistent and well founded reasons (Velasquez et al, 1987).

Velasquez et al (1987) do use a second perspective of ethics, as the study and development of personal ethical standards. Also, Sembok (2003) added that, apart from the study and development of personal ethical standards, community ethical standards are also very important in this second perspective. One's efforts to understand one's moral beliefs and conduct so as to maintain the reasonable standards that shape our society also counts as ethics. Ethics is used in this research to mean both the moral standards and principles that guide the actions of a particular group of people and also the systematic study of these standards that define how they ought to act or ought not to act. Philosophers usually divide ethics into three subject areas; metaethics, normative ethics and applied ethics.

2.2.1 Metaethics

Metaethics is a branch of ethics that investigates where our ethical principles or standards come from and what they mean (Fieser, 2009). It is an attempt to understand the presuppositions and commitments of moral standards (Sayre-McCord, 2007). Owing to the fact that 'meta' is a Greek word which means 'beyond or after', etymologically, metaethics goes beyond moral standards and principles to unpack their origin. It tries to understand the metaphysical, semantic and psychological underpinnings of moral thoughts. In metaethics, there is an attempt to discover the origin or cause of right and

wrong (Gowdy, 2010). Two metaphysical issues in metaethics are objectivism and relativism. The proponents of ethical or moral objectivism believe that moral values exist beyond subjective human conventions; are absolute, universal and therefore applies to all rational creatures (Fieser, 2009). On the other hand, moral relativists argue that moral values or standards are products of human conventions; created either by individuals (individual relativism) or by a particular society (cultural relativism) (Gowans, 2008; Fieser, 2009).

2.2.2 Normative Ethics

Normative ethics attempts to provide a general theory of how we ought to live by examining standards for the rightness and wrongness of actions. It involves determining how moral actions are arrived at and how they are justified. The Golden Rule is a classic example of a normative principle: 'do to others what you would want them do to you' (Fieser, 2009). Ethical theories under normative ethics include; virtue theories, duty theories and consequentialist theories. Understanding these theories can help researchers to appreciate the rationale behind ethically reviewing their research projects.

2.2.2.1 Virtue Theories

Virtue theory is an ethical theory that places less emphasis on rules or consequences and places character as a key element of ethical thinking. Instead of learning rules, and making sure our actions live up to the rules, there is a focus on the importance of developing good habits of character such as benevolence (Fieser, 2001). Virtue ethics theory is currently one of the major approaches in normative ethics and different strands of theories have been developed under virtue ethics. The first is centred on the concept of *Eudaimonia* which is an Aristotelian term translated as *happiness.* For the

proponents of this theory, Eudaimonia is fulfilment; the life of virtue where man acts virtuously in accordance with reason. One's virtuous actions are justified if he/she understands the virtues as good in themselves and they are important elements of one's eudaimonia - contentment and happiness (Hursthouse, 2007; Athanassoulis, 2010). Slote (1992) developed another virtue ethics theory based on the idea of agent. He distinguished between a moral agent's acquisition of virtue from inner dispositions and moral actions of agents that depend on the ethical judgements about the inner life of the other agents who perform those actions. These refer to acquiring virtues by oneself and by looking up to admirably virtuous people. Ethics of care is another virtue theory that is mainly supported by feminists like Baier (1985). Here there is an attempt to shift attention from concepts such as justice and autonomy to virtues exemplified by women such as care, patience and self-sacrifice. No matter which virtue theory one supports, there is a concentration on the moral character of the agent; courage, generosity, honesty, compassion etc. In ICT research therefore, when one appreciates ethics review procedures owing to his/her understanding and practice of the above virtues, the person can be said to share the ethical principles of virtue ethics.

2.2.2.2 Duty Theories

Duty theories concentrate on the moral action instead of the character traits possessed by the moral agent. According to Fieser (2009), duty theories base morality on specific, foundational principles of obligation. These theories are sometimes called *deontological*, from the Greek word *deon*, or duty, in view of the foundational nature of duty or obligation. These are otherwise called non-consequentialist theories and maintain that ethical principles are obligatory no matter what the consequences of our actions are. Kant's moral theory which suggests that acts ought to be judged not by their

consequences but by whether they conform to the requirements of rationality and human dignity is a major example of a non-consequentialist theory. For Kant, pure reason is in itself practical and gives man the moral law (Kant, 1956). This means that it is through what Kant referred to as pure practical reason that we understand our moral duties which comes to us as categorical imperatives. Human actions ought to be performed out of respect for this moral law- for the sake of duty. An ICT researcher can then be said to be practising Kantian ethical principles if he/she ethically reviews his/her research out of respect for Kant's categorical imperatives [see section 7.2].

2.2.2.3 Consequentialist Theories

MacKinnon (2004, p.10) wrote that ''those theories that base moral judgements on consequences are called consequentialist or sometimes teleological moral theories.'' For these theories, normative properties depend only on consequences. That means that the results of actions do matter morally. That means that the practice of ethics reviews inspired only by consequences can be termed consequentialist [see section 7.2]. Two forms of consequentialism exist; rule consequentialism and act consequentialism.

Utilitarianism - which teaches that ''the end of human conduct is happiness, and that consequently the discriminating norm which distinguishes conduct into right and wrong is pleasure and pain'' (Fox, 1912) is a classical example of consequentialist moral theory. According to one of the strongest advocates of utilitarianism, John Stuart Mill, this is a moral theory which accepts as the foundation of morals, utility or the greatest happiness principle holds that actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse or happiness (Mills, 2007). Even

though utilitarianism (just like any ethical theory) faces several criticisms, it is the most popular consequentialist theory today (Hubin, 2004).

2.2.3 Applied Ethics

Generally speaking, applied ethics is that area of ethics that places normative rules in practical contexts. It consists of the application of normative ethical principles in practical areas like business, medicine, law and technology. It is a new area of ethics that discusses the analysis of specific, controversial but moral issues in these areas of study (Fieser, 2001). It is acknowledged that these areas of study raise a variety of ethical problems and the area of ethics that considers these concerns is called applied ethics. Today, there are different names for different types of applied ethics depending on the area of study. Some include business ethics, bioethics, nanoethics, disclosive ethics and computer ethics. In the present research is an important part of computer ethics that focuses on the moral standards that can or should guide research conduct in computing. It involves the application of normative principles in practical applications of computing technology. A detailed discussion on the relationship between ethics and computing especially ICT is therefore contained in section 2.4. Before then, here is a section that seeks to establish the relationship and differences between ethics and law.

2.3 Ethics and Law

In our everyday life, some people have the understanding that following the law is the same as being ethical. This makes it important for the relationship between these two terms to be established here. Laws are a set of rules that govern a society which are usually enforced (Anstead, 1999). Laws are created by institutions or a government to further the agreed or accepted aims of the society which can sometimes but ethical or

unethical. Slavery laws of the 18th century society and the apartheid laws of the old South Africa are examples of laws that were unethical. That means that following the guidance of the law does not necessarily result in ethical decisions (Velasquez et al, 2010; Duquenoy et al, 2008). Ethics goes beyond the tenets of the law thus; there are a lot of ethical issues that are not legal or not yet legal. Stahl (2011) listed a number of ethical issues that can be associated with emerging ICTs which are not yet legally regulated. These include; autonomy, freedom, agency, possibility of persuasion or coercion and the possibility of machine ethics. In so many circumstances the law mandates ethical conduct because the legal regulation of ethical issues usually encourages their effective consideration (Anstead, 1999). An example is the *Human Tissue Act 2004* which ethically guides research involving human tissues. Even though clarifying this relationship (Ethics and Law) is relevant in the general discussions in this thesis, a major relationship involved in all discussions here is the one between ethics and ICT.

2.4 Ethics and ICT

Following from the above conceptual clarifications, it is imperative to explore the relationship between these two terms that are at the centre of this present research - ICT and Ethics. The ultimate goal of ICT is to meet the goals, goods and services of society (Winston & Edelbach, 2000). An ICT development that does not meet this goal can be termed as a failure. This is because there is a held tenet among scholars that there is, and should be, an inseparable relationship between science and society because of what is referred to as 'social contract' (Guston, 2000; Gibbons, 1999). It is argued that there is a voluntary but mutual responsibility between society and science. In her book *The Ethical Canary,* Somerville argues that science should have

> ... a profound respect for life, in particular human life … and we must act to protect the human spirit – the intangible, invisible, immeasurable reality that we need to find meaning in life and to make life worth living… (Somerville, 2004, pp.7-8)

She continues by stating that, any research in science that does not respect human life ought to be avoided even if it has some beneficial consequences.

The emergence of increasingly unpredictable, uncertain and unquantifiable benefits and possibly catastrophic risks associated with ICT highlights the need for a study that will critically reflect on the ethical, legal, quality, social and sometimes environmental implications of both the development and usage of ICT. This is where ethics comes into ICT (Bynum & Rogerson, 2004). This is an area that considers ICT in an ethical framework, considering ethical questions that are exacerbated by the ways in which ICT is developed or used. It studies how standard ethical questions are changed by old or new technologies and the imports of old ethical questions amplified. For example, the ethical questions of privacy and free speech are given new shape and urgency in the age of ICT.

The above type of ethics which is a form of applied ethics has been given different names by different scholars with slightly different meanings. Moor (1985) called it ‘‘computer ethics’’ to mean a field concerned with ‘‘policy vacuums’’ and ‘‘conceptual muddles’’ regarding the social and ethical use of information technology. In place of the above term, Floridi (1999) suggests that we use ‘‘Information Ethics’’ to refer to the philosophical foundation of Computer ethics. Tavani (2007, p.3) uses the term ‘‘cyberethics’’ to denote the study of moral, legal and social issues involving

‘‘cybertechnology’’ (a wide range of computing and communications devices, from stand-alone computers to connected, or networked, computing and communications technologies). No matter what name one gives it though, the idea is that, there is need for ethics in the development (research) and usage of ICT. It is important to note that the body of work on the ethical issues of ICT rests on the principles set forward by the above established ethical theories [see section 2.2] which analytically determines what moral problems might be involved in the research/development and usage of ICT products. That means ethical reflections in ICT can be metaethical or normative.

As a field of study, computer ethics was founded in the early 1940s by Norbert Wiener who used the world ‘‘cybernetics’’ (Bynum, 2000). Unfortunately, Wiener’s seminal works remained undeveloped for a decade and half later when authors such as Weizenbaum (1976) and Maner (1980) produced works that led to a greater interest in computer-related ethical issues (Ibid). The next phase of the development of this study saw classic works from Moor (1985), Johnson (1985), Rogerson (1998) and Bynum (1999) that have inspired a new field of applied ethics today.

To underline the relevance of this area of study, Tavani (2007) quotes Michael Bayles (2003) who argues that professionals have a special obligation to their clients to be worthy of a client’s trust and this leads to obligations of honesty, candor, competence, diligence, loyalty and discretion. Tavani (2007) then argues that all professionals in the computing field should be bound by similar standards of obligation to their clients and users. Gotterbarn (2001) goes further by stating that software engineers have special moral obligations because they have significant opportunities to (1) do good or cause harm, (2) enable others to do good or cause harm and (3) influence others to do good or

cause harm. This means that the distinctive features of ICT do not only offer ICT professionals with opportunities of doing good or causing harm but influencing/enabling others to do so. It also means that ICT professionals have a duty to do good and not to cause harm, enable others to do good and not cause harm, and ultimately should influence others to do good and not to cause harm. And for this to be achieved there should be ethical considerations before (Weckert, 2002), during and after the development of ICT artefacts.

The incorporation of ethics into ICT research is not to stop the research but for ethics to become a co-player by discussing the needs and goals of the society and then serving as a framework to guide society towards these goals. One way this can be done is through a development of an effective practical ERP to help researchers in ICT develop technologies that will cause no harm to human life [See section 2.5]. It will help researchers to develop ICT through a normative ideal and a pragmatic guide (Weckert & Moor, 2007).

Furthermore, since the central aim of this research lays emphasis on ICT research, there would be an attempt to concentrate only on the ethics involved in research and not the general field of computer ethics. This is an area that can best be captured by the term ‘‘ethics reviews’’ which is part of a more general concept- research ethics.

2.5 Research Ethics: History

Generally, research processes raise some problems which significantly affect the aims of research such as generation of knowledge, promotion of truth, avoidance of error and harm. This has prompted the development of an area of study, called Research Ethics that seeks to address these problems. The specific area of interest in Research ethics is

the analysis of ethical issues that are raised in research which can be before, during and after the conduct of a research activity. ESRC refers to this as the moral principles guiding research, from its inception through to completion and publication of results and beyond (ESRC, 2005). Gordon (1998) in a dictionary of sociology defined it as, the application of moral rules and professional codes of conduct to the process of research. It has received much attention in the last century following a spate of controversial issues in biomedical research.

Prior to the last century, there was little or no discussion on the application of moral principles in conducting research. A monumental chapter in the history of research ethics opened during the Second World War II. During this time, a series of Nazi medical experiments led to the deaths of many. The first of these was a high altitude experiment that killed 40% of the 200 participants. The second was a parachuting into cold water experiment on 300 prisoners during which these participants suffered a mortality rate of 30%. Many of these experiments went on throughout the war and a mortality rate of 25% recorded (FHI, 2004).

Owing to this, on December 9, 1946, criminal proceedings were opened against 23 German physicians. 15 of these physicians were found guilty and as a result, the Nuremberg Code was established in 1948 (ORI, 2009). For the first time, there was an international document in which issues such as; informed consent, voluntary participation and benefits of research must outweigh the risks and animal experimentation prior to human experiments were advocated. This document did not carry the force of law and many researchers either ignored it or did not know much about it.

In the 1950s, neglect of the principles set out in the Nuremberg code led to another defining moment in the history of research ethics. When the drug *thalidomide*, developed by German pharmaceutical company Grünenthal, was approved in Europe as a sedative, it was not approved for use in the US. Samples of this drug were supplied to paid physicians in the US in order to study its safety. This experimental drug was prescribed to patients including pregnant women. There was complete lack of voluntary participation and informed consent in this experiment. Administration of this drug caused serious damages to the foetus and about 12,000 babies were born with severe deformities (ORI, 2009). This led to the passage of the Drug Amendments of 1962 to the Food, Drug and Cosmetic Act, popularly called the "Kefauver Amendments''.

There was also the Tuskegee Syphilis Study conducted by the U.S public Health Service which started in 1932 and was stopped in 1972. In this study on the natural history of untreated syphilis, low income earning black males were not informed of their diagonised disease (syphilis) and were generally denied treatment even after the treatment was widely available. The issues raised by this study included lack of respect for persons, deception and coercion, lack of informed consent and targeting a vulnerable population (FHI, 2004). Due to the publicity this study received in 1972, the study was stopped in 1973 by the U.S. Department of Health, Education, and Welfare. In 1974, Congress passed the National Research Act, and the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research was established (Zimmerman, 1997).

It was this commission that prepared the Belmont Report in 1979. This report is a statement of basic ethical principles and guidelines on the conduct of research involving human subjects. The three basic principles advocated in this report include the

principles of respect for persons, beneficence and justice (ORI, 2009). This report drew a lot of inspiration from an earlier document established during the World Medical Association summit of 1964 in Helsinki. This document popularly called the Declaration of Helsinki contained ethical guidelines that should govern the conduct of research involving human subjects. Since then, it has been revised about five times and has long become the guiding principle of international research ethics.

The application of research ethics to evaluate biomedical research has immensely developed in the last century. This informs the fact that research ethics traditionally focussed on issues in biomedical research. Many still believe that research ethics is suited only to medical research. However, research in computing, humanities and the social sciences raise and will continue to raise ethical, social and legal problems. The existing statutes and guidelines for the ethical conduct of these researches are influenced mainly by both the Helsinki Declaration and also the Belmont report. Important but markedly different ethical issues arise in these fields but obligations for researchers remain the same.

Today, ethical considerations have become an integral part of research, and ethics review is a major part of this. Many funding bodies including the European Union Education Commission and Higher Education Academy of UK consider it to be of highest priority and thus, it has become one of the criteria for approving research grants.

In ICT, researchers are faced with challenges in research ethics which is due to the changing notion of what constitutes research and the impact ICT products are having in the world today. In light of the unique nature of ICT research and the features of its products, there are emerging unique ethical questions and the old ones are given

different meanings thus requiring formal ethics review- which is part of research ethics. Today, research ethics and ethics reviews are gradually being established in computing departments but so far, there is still a dearth of literature on its acceptance and application in ICT departments/faculties in UK. This research hopes to make contributions in this regard.

2.6 Ethics Review

As an important part of research ethics, ethics review is a system set-up by research institutions to find out if ethical norms are being adhered to during research. The key points here are understanding and identifying ethical problems associated with the research and then finding ways of handling them. Therefore, it entails understanding the ethical norms involved in research, discovering both actual and potentials ethical problems associated with the present research and making sure these norms are adhered to and the associated problems get effective solutions. This is not a checklist compliance process but a procedure that enhances the positive impact of research results (EC, 2008). Owing to the dynamic nature of ethical problems, ethical reviews usually have a process that operates both before, during and after the research- be it in medicine, social science, psychology or ICT. This will help to develop a guideline that makes research effective. In most institutions that carry out ethics reviews on research projects, there is usually a set-up procedure or policy which researchers are expected to follow. Also, a board or committee is commissioned to ensure that researchers comply with these policies. In medical research, there are established standard ethics review procedures that researchers are usually familiar with (WHO, 2011). However, there is no literature on any standardized procedure specific for ICT research.

Most of the guidelines for ethics reviews find their bases on the principles of the World Medical Association (WMA) Declaration of Helsinki. This 35-article declaration hinges on such points as the respect for the individual human person (Article 9) and his/her right to self-determination, the right to voluntary participation and the right to make informed decision (Articles 22, 24, 25, 26, 27 and 28). It notes that there is always the need for research involving human subjects (Article 5), animals (Article 12) and most interventions in such research involve risks and burdens (Article 8). It states that the physician or any other researcher (Article 2) has a duty towards his patient (Articles 3 and 4) or research subjects (Article 6) whose well-being must take precedence over all other interests. The declaration goes further to remind all researchers that both national and international ethical, legal and regulatory norms and standards of research should be considered (Article 10). It is the duty of the researcher to protect the life, dignity, integrity, privacy and confidentiality of the research subjects. (Articles 11 and 23) Therefore, research must be conducted by competent and qualified individuals (Article 16) with a thorough knowledge of the scientific background (Article 12) using approved research protocol (Article 14) which will be subject to ethical review by a research ethics committee before research begins (Article 15). This will help in the assessment of predictable risk and burdens to individuals and communities involved (Articles 17 and 18) and also the environment (Article 13). Information about a research must be made public (Article 19) and when risks are found to outweigh the potential benefits, the research should be stopped immediately (Articles 20). However, research should continue only when the potentials benefits outweigh inherent risks (Article 21) and the complete and accurate publication of the results of research is the ethical obligation of the researcher (Article 30). The research subjects have the right to know the outcome of

the research (Articles 33 and 34) while researchers are advised not to cause harm to them (Article 31) by testing their unproven methods against best current proven methods (Article 32). An unproven method can only be used if there are no proven methods in this area and that the researcher has the informed consent of the research subject (Article 35).

This is a snapshot of the declaration which was, at the time, for medical researchers. The declaration also proposed certain fundamental ethical principles that ought to guide researchers. Even though these originated in medical research and within the human subjects protection research, it can be evaluated and appropriately modified and clarified for ICT research. They include;

***Principle of Respect for Persons*:** The Belmont report (1978) asserts that this principle encompasses of two ethical convictions: first, that individuals ought to be treated as autonomous agents, and second, that persons with diminished autonomy are entitled to protection. This means that human beings are free agents and responsible persons and therefore should be treated as such according to their ability in their different circumstances. Every individual has the capacity for self-determination. This implies that such an individual should be free from coercion in decision making and others should respect his/her decision, protect his privacy and maintain his confidentiality. However, those who are incapable of self-determination should be extensively protected even to the point of exclusion from the research. In ICT research, these are often applied through *informed consent* (Kenneally et al, 2010). It means that consent to use data and information systems for a specific purpose in research should be obtained after detailed

information about the research and its implications have been disclosed to potential research participants.

The principles of beneficence and of non-malfeasance: Two general rules are specified under this principle: ‘‘(1) do not harm and (2) maximise possible benefits and minimize possible harms’’ (Belmont report, 1978). That means that the researcher ought to do good and minimize both physical and psychological harm to the research subjects. In ICT therefore, researchers should systematically assess both risks and benefits of the research on privacy, civil rights, and the well-being of persons. Also, research should be designed and conducted to maximise probable benefits and minimize harms to persons and organisations (Kenneally et al, 2010). So then, if research causes risk or harm to any person, systems or data, such persons should be notified. Giving the nature of ICT, researchers ought then to consider the risks and harm their research can pose to persons and information systems.

The principle of equality and justice*:* In this principle, there is an understanding that every human individual has rights to be treated equally as others and also the right to a just and fair treatment. It focuses on fairness in determining who ought to receive the benefits of research and bear the burdens (Belmont Report, 1978).

Applying this to ICT, Kenneally et al, (2010) opine that the benefits and burdens of ICT research should be shared fairly between research target subjects and beneficiaries of the research results. Also, the selection of research subjects should be equitable, except when biased selection may be beneficial. This means that discriminations at any level in research should be avoided.

From the above principles, scholars have identified some ethical issues associated with current ICT research. These issues have constantly been discussed in ICT literature and are discussed below.

2.6.1 Ethics Reviews in ICT Research (Ethical Issues)

Many researches in different disciplines can identify with most of the points raised in the above declaration of Helsinki. For ICT, some of these points include: (a) that research raises problems and involves risks. In ICT, these problems have the potential to harm individuals, organizations or the society (b) that research can involve human persons. Even if the research does not explicitly involve human beings, it can implicitly do so which is the case in most ICT projects. Also there should be a proper definition of the human person because (c) These human persons can have such rights as; life, self-determination, voluntary participation, informed consent, dignity, integrity, privacy and confidentiality (d), therefore the researcher has a duty towards them. (e) That researchers ought to be competent. Giving an incompetent researcher the commission to carry out a high level research can become ethically problematic. (f) Researchers must weigh potential benefits against the inherent risks of doing the research. This is an important issue in ICT since the artefacts are more problematic than the research process. Understanding the potential risks involved in the usage of the artefacts, becomes an important matter to be considered during the research, (g) that the research outcome must be published accurately and the participants should have access to these outcomes. Any framework for ethics reviews of ICT research projects therefore should be based on these key points of the above declaration.

As a new and constantly changing discipline, the ethical and social problems associated with ICT research are still underexplored. While there are some that are yet to receive clear and detailed discussions by scholars, some are increasingly written about in ICT literature. Discussions here will be divided into ethical issues in ICT research that are general research ethics issues and some ethical discussions specific to ICT research. The former include privacy (informed consent, confidentiality and anonymity) and intellectual property issues (industrial property and copyright) while the latter include issues like personhood, agency and rights.

2.6.1.1 Privacy

Despite a vast array of literature on ‘‘privacy’’, this concept has acquired no universally accepted definition. It has often generated debates and controversies in so many disciplines. However, most of its available definitions are either statutory or ethical. Ethically, Frederick (2009) understands it as having control over the extent, timing, and circumstances of sharing oneself, whether physically, behaviourally or intellectually, with others. According to Stone et al (1983), it is the ability of the individual to personally control information about oneself. In terms of statute, it is one of the fundamental rights of a human being which was explicitly spelled out in article 12 of the Universal Declaration of Human Rights of 1948. It states that;

> No one should be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks on his honour or reputation. Everyone has the right to the protection of the law against such interferences or attacks.

Similarly, Article 8 of the European Convention for the Protection of Human Rights and Fundamental Freedoms of 1950 also states that, ‘‘everyone has the right to respect for his private and family life, his home and his correspondence.’’

In the UK, the Calcutt Committee (1990) defined privacy as the right of the individual to be protected against intrusion into his personal life or affairs, or those of his family, by direct physical means or by publication of information. This has become one of the most widely discussed issues in the production and usage of ICT today. Major issues privacy concerns in ICT research include informed consent, confidentiality and anonymity. However, no matter the privacy concern involved, characteristics of ICT such as malleability, pervasiveness and ubiquity can make the issue of privacy more complex than in any other discipline.

Informed Consent:

In research, informed consent originated in medical research ethics to focus on the right of participants in a research to get adequate information and implications of their participation before giving their consent to participate. It is a concept that is rooted in multiple disciplines such as moral philosophy, law, behavioural sciences and the medical sciences (Faden et al., 1986). These disciplines with their distinctive forms of reasoning have varied interpretations of this concept. However, in research it is an important part of privacy (including research in ICT) which underlines the core value or principle of human autonomy (Flick, 2009). It is a requirement of the ethical principle of respect for person in research which involves the autonomous decision making ability of the research participant.

Informed consent in research which has its basis in ethical codes, statutes and administrative regulations contains three elements; information, comprehension and

voluntariness (del Carmen & Joffe, 2005). First, participants in ICT research should be offered sufficient information before making a decision to participate. Information such as procedures, purposes, risks, anticipated benefits and alternative procedures are relevant in the process of informed consent. Second, the researcher should make the information available in a manner in which the participant can understand it. Where the participant has limited ability to understand or has no legal right to give consent (minors, persons with learning disability) understanding and permission by third persons can be sought. Finally, the consent must be given voluntarily. The participant ought not to consent under coercion or undue persuasion. Also, informed consent is an ongoing process because the researcher should provide the participants with any new information which might influence their continued participation (RCN, 2011). Even though a host of literature exists on the meanings and interpretations of these elements of informed consent in different contexts, there has been no universal agreement on whether there is any one less important or more important than the others (Levine, 1991). These elements are equally important in the process of seeking informed consent.

Confidentiality:

Generally, confidentiality involves the treatment of information an individual provides in a relationship of trust and with the expectation that it will not be divulged to others in ways that are inconsistent with the understanding of the original disclosure without the individual's permission (Frederick, 2009). In ICT research therefore, it means keeping the information given by or about the participant secure and secret from others unless permission is granted to share them. Confidentiality is an important part of building and maintaining trust between the researcher and the participants. Confidentiality is owed to

all participants in a research without exception. Research participants have the right to rely on the trust or discretion of the researcher that his/her identifiable information provided or discovered in the course of a research will not be disclosed without permission (British Medical Association, 1999). One way a researcher can achieve this is by ensuring that appropriate measures are taken to store research data in a secure manner. The disclosure of such information is generally done with the permission of the participant. However in some cases (like cases involving major police investigations such as terrorism and child abuse) legal requirements permit the disclosure of participant's information without the permission of the participant (Colantuono, 2009). This is a research ethics issue supported by the ethical principles of respect for persons and also beneficence and non- malfeasance.

Anonymity

Anonymity is another important aspect of maintaining the privacy of research participants. The researcher protects the participants' right to privacy by guaranteeing anonymity through the removal of any identifying information from the data and the reports of the research outcomes (Singleton and Straits, 1999). Anonymity differs from confidentiality in the sense that anonymity is concerned with the non-disclosure of the participants' identities whereas confidentiality is concerned with the non-disclosure of the information provided by the participant. Anonymity not only protects the identity of the participants, in some cases, it protects the participant from any kind of suffering or harm (Clark, 2006). In addition to this, the UK Data Protection Act (1998) has ensured that there are regulations guiding the obtaining, holding and disclosure of research information which are aimed at maintaining anonymity. Just like confidentiality, there

are some exceptions to this. The ethical principles of beneficence and non-malfeasance and also the principle of respect for persons are the foundations of this ethical issue.

2.6.1.2 Intellectual Property issues

The concept of intellectual property generates varied discussions in different fields of study. Intellectual property involves all the creations of the human mind. It represents the property of the mind or intellect which can be an invention, trademark, original design or the practical application of a good idea (Commonwealth of Australia, 2005). Intellectual property generally relates to the products of information or knowledge which can also be made into tangible items. These items do not represent the property but the information or knowledge they reflect is what is called intellectual property.

The recognition of the relevance of protecting intellectual property was first observed in the *Paris Convention for the Protection of Intellectual Property* in 1883 and the *Berne Convention for the Protection of Literary and Artistic Works* in 1886. Following the incorporation of property as one of the fundamental rights of a human being by the *Universal Declaration of Human Rights* in 1948, the *Convention Establishing the World Intellectual Property Organization* (1967) listed these as protected by intellectual property rights; literary, artistic and scientific works; performances of performing artists, phonograms, and broadcasts; inventions in all fields of human endeavour; scientific discoveries; industrial designs; trademarks, service marks, and commercial names and designations; protection against unfair competition; and all other rights resulting from intellectual activity. There are two branches of Intellectual property; industrial property and copyright. ***Industrial property*** relates to patents which protects inventions and industrial designs; trademarks, service marks, layout-designs of

integrated circuits, commercial names and designations (WIPO, 2011). ***Copyright*** on the other hand deals with artistic creations, such as books, films, music, paintings and sculptures and ICT-based works such as computer programs.

Ethically speaking, the moral arguments for intellectual property are based on *rights ethics*. Many international (such as the Universal Declaration of Human Rights of 1948) and regional conventions have recognised intellectual property rights as one of the fundamental rights of a owners of such properties. This right is a justified claim on others who have the duty or obligation to respect it. As Velázquez et al (1990) state, the justification of this claim depends on moral standards acknowledged and accepted not just by the claimant but also by the society in general which are not necessarily codified in law. Therefore, intellectual property is a moral right that an intellectual property owner can justifiably claim authorship of the work and to object to any distortion or modification of the work on others who have the obligation or duty to respect it. The normative ethical theory of duty offers a foundational support for this argument. Also the ethical principles of respect for persons and beneficence offer practical perspectives on this issue.

In ICT research therefore, researchers are encouraged to understand their duty or obligation to respect the intellectual property rights of others whether it is in software development or any other research project. Lack of such respect in research (in the form of plagiarism and other copyright infringements) has harmful effects on the owners of property rights and is prohibited in many countries today. In the UK, schools enforce the rules on plagiarism while legal institutions such as the courts enforce copyright infringements.

2.6.1.3 Other Ethical Discussions in ICT Research

In the recent past, ICTs have successfully delivered products that consumers have eagerly embraced, however, the increased pervasiveness, ubiquity, miniaturization, interactivity and embeddedness of current and emerging technologies make them more controversial and problematic. These features of ICT, evident in emerging technologies, such as artificial intelligence (AI), ambient intelligence, affective computing, bioelectronics neuroelectronics, robotics, human-machine symbiosis and cloud computing reveal other ethical discussions that have become important in ICT research and development. Among these include discussions on such issues such as personhood, agency and rights. These issues do not currently get much attention in the existing review procedures. Even though they are generally discussed with regard to ICT product applications (McLean, 2011), addressing them during the research stage will help the production of a more acceptable product.

Personhood/Agency

The issue of personhood has been discussed by scholars (especially philosophers) for centuries. At the centre of these discussions, from Kant's (1956) ''kingdom of ends'' to contemporary authors like Singer (1993) and Tooley (1998), is the question of moral agency. Kant's idea of personhood originates from his categorical imperative that calls for responsibilities towards humans as ends in themselves. This then highlights his views that the human person has intrinsic value which differentiates him/her from other living beings (Nelson, 2009). For Singer (1993), the value of personhood lies in the fact that a person (a) is rational and self-conscious (b) desires and makes plans (c) desires to continue living and (d) is autonomous. Together with Fletcher's (1966) 20 criteria of what it means to be a truly human being (which includes self-control and a sense of

time), Singer's position is philosophically known as empirical functionalism. This position controversially denies personhood to any human that does not have these qualities. In contrast to empirical functionalism is the view that all humans are defined as persons - ontological personalism (Nelson, 2009). Following from Kant's position, both views understand persons as moral agents.

In the past, human personhood was extensively discussed in bioethics especially with regard to issues such as abortion and other issues on the beginning of life (Cranford & Smith, 1987). However, more recently, the ethical issue of personhood is being raised in ICT in relation to the possibility or actual creation of new kinds of living beings such as all kinds of digital robots, nanobots and bionics. Technological highlights in this area include hybridizations between ICT and non-human beings and ICT and human beings (Capurro, 2011). Research into these hybrids (living ICT components and living humans with incorporated ICT) raises such ethical questions as: does an artificial brain constitute a person? Are robots morally culpable? Since artificial brains can resume functionality after shutdown, would the shutdown of an artificial brain be called death, unconsciousness or sleep? Discussions on these questions are or should be discussed and possibly clarified at the earliest stage of these ICT researches because the actual development of these artefacts and their application are fundamentally changing worldviews on personhood and agency. They are raising questions on morality and identity. Even though these ethical questions have not received much attention in ICT research, they are not issues that should be ignored.

Rights

Another issue related to discussions on personhood is the problem of rights and values. This is because the UN's universal declaration of human rights pointed out the dignity and worth of the human person as the foundation of the universally declared fundamental human rights (United Nations, 1948). By implication, only human persons are entitled to rights and freedoms which often include the right to life and liberty, freedom of thought and expression and equality before the law. Today many animal rights activist believe that ascription of both moral and legal rights to other animals should be a logical progression from the above principle (Uncaged, 2011). This is because they believe that all sentient creatures should have rights to life just as humans.

Research in AI and affective computing that produces or promises computer autonomous (see section 2.1.2] agents that can exhibit a high level of intelligence and emotions is radically changing the notion of rights that are traditionally attributed to human persons. Compelling questions for considerations include; will the presently regarded ''inanimate'' computer agents be considered alive and subsequently persons in the future? Should they be entitled to some basic rights? If so what social, moral and political rights are to be granted to robots?

McNally & Inayatullah (1988) believe that in the future, rights will be extended to all things including robots. This position relies on their belief that rights are defined by ethnocentric worldviews which are bound to expand in the future to appreciate the interrelated rights of humans, machines and nature. Similar to this view, Calverly (2006) argues that artificial consciousness will present a strong case for the legal and moral treatments of robots in the near future. He draws an analogy between animal

rights and android rights. However, Mitchell (2011) responds to this by pointing out that animal rights stem from the fact that they can feel pain or suffer. He argues that because robots are not (yet) vulnerable to the same pain stimulus as other living agents they should not have the same rights. Nevertheless, in the future, if robots are designed in a way that they become sentient, rights should be granted to them (Singer & Sagan, 2009). Considering the increasing level of advancements towards incorporating human brain cells in the design of humanoids, this discussion is a complex one that carries a lot of ethical importance. Thus, this researcher considers it a discussion that should start during the research and development of these ICT artefacts.

The three ethical principles of research [see section 2.5] can be identified at the heart of these discussions. This is because, accepting the personhood of humanoid robots and the recognition of their rights will logically mean that they can be treated in the same way as human persons in research.

2.7 Relationship between Research/Development and Usage

As pointed out earlier, there is a relationship between ICT research and the society [see section 2.4]. In this broader relationship is another smaller but important one between the research/development and the usage of the ICT artefacts which involves the researchers and the users. ICT products are researched and developed by researchers for the consumption of the users directly or indirectly. The usage of these products in turn has huge social, cultural, political and ethical impacts on the life of the users (Gotterbarn & Rogerson, 1998). Even though most of these impacts are good, there are equally harmful ones [See section 2.1.2]. That means ICT products are used today both ethically and unethically. It is the responsibility of the researchers and developers then

to produce artefacts of a quality that minimizes such impacts (Goterbarn & Rogerson, 1998). However, there may be the tendency of ICT researchers to distance themselves from the unethical uses of these products. The reason behind this might be that it was the users (moral agents) who carry out activities with the products and therefore should be responsible for their actions. However, some ICT researchers would agree that some produced artefacts provide the platform that has harmful impacts.

In 2008, The Canadian Internet Policy and Public Interest Clinic (CIPPIC), based at the University of Ottawa's Faculty of Law filed a privacy complaint to Canada's federal Office of the Privacy Commissioner (OPC) against the social networking giant, Facebook (Davies, 2010). This complaint alleged that Facebook's operation violated the Canadian *Personal Information Protection and Electronic Documents Act* (PIPEDA). The privacy issues raised by this group bordered on lack of sufficient knowledge provided to users and informed consent before the collection of their personal information, and also issues of third party access to these information (Lawson, 2008). Even though the assistant Privacy Commissioner Elizabeth Denham in 2009 found that some of the claims of CIPPIC were unfounded, she found that Facebook did not do enough to ensure users granted informed consent for the disclosure of personal information to third parties and did not provide enough security to ensure unauthorized access by third party developers to personal information in their possession (Denham, 2009). Facebook reacted to this by introducing new privacy settings to address various privacy issues (Davies, 2010). In essence this means that this ICT artefact- *Facebook*- was developed with a platform that made the invasion of people's privacy by both the company and third parties possible; proving that there is indeed some relationship

between research/development and usage. This raises the need to address most ethical problems associated with ICT usage (not only the issues concerning its research) at the beginning of the research and development of ICT products (Runciman, 2004). This does not mean that these issues can be completely solved at this stage but addressing the identified ethical issues at the beginning of the project will help in minimizing the harm it might cause in the future.

The European Commission recognises this relationship and the ethical impact it can have on the society. Thus, they have funded ETICA [see section 1.1] which ran from April 2009 to May, 2011. The main objectives of this project was to identify the ethical issues of emerging technologies and their potential application areas in order to analyse and evaluate the ethical issues that may arise from them. It is hoped that the findings of this project would help researchers and developers in ICT to produce artefacts that would have minimal harmful impacts in the society. For ICT researchers, the key point here is that it is not enough to consider the traditional ethical problems of carrying out a research, there is a need to consider other problems the platform they create can cause or exacerbate. Such issues according to Stahl (2011) include security, digital divides, access, consequences of technology for our view of humans (such as transhumanism) and gender issues. Ethics reviews of ICT research in some ways also involve these issues which are normally discussed in ICT usage.

2.8 Regulatory framework for ICT research in UK

Unlike in the medical science research, ICT research in the UK has little formal regulatory framework. In medical research, there are national bodies such as the *National Research Ethics Service* (NRES) and the *Medical Research Council* (MRC)

through its *Ethics, Regulation and Public Involvement Committee* that regulate research with respect to the ethics of human involvement in medicine. Such regulations as the *Medicines for Human Use (Clinical Trials) Regulations 2004* and the *Human Tissue Act 2004* provide frameworks for doing that. Ethically reviewing all medical research projects become an important process of effectively regulating research.

However, in ICT research British Computer Society's professional code of conduct developed in 1992 provides some guidelines. This code sets out the standards of conduct of BCS members (who are ICT professionals) towards the public, relevant authority and the profession. Even though this provides ICT researchers who are members of this body with a general idea of how to conduct their activities (including research) ethically, it does not provide guidelines on particular issues of research ethics in ICT.

There are also some government regulations that cover in general some research ethics issues in ICT. These include the *Data Protection Act 1998; Privacy and Electronic Communication Regulations 2011* and *Freedom of Information Act, 2000.* These are regulations enforced by the Information Commissioner's Office (ICO) and handle mainly issues of privacy. On July 20, 2011, the ICO found that the University of York breached the Data Protection Act by failing to close a test area on its website that contained thousands of student's personal details (ICO, 2011). There is also The *Copyright, Designs and Patents Act 1988* that addresses the issue of Intellectual property rights [see section 2.6.1]. These are general legal guidance on some issues that arise in ICT research. There is still little ethical guidance for undertaking ICT research projects in the UK computing departments/faculties. The BCS has done some work on a framework for the ethical assessment of new and emerging technologies called DIODE

– *Define, Issues, Options, Decision and Explanation* (Harris et al, 2008). Even though this framework was developed and tested in 2008, there is little evidence in the available literature to suggest that it is being used by any university in the UK. Also, there is no evidence that ICT departments/faculties in UK ethically review their research projects at undergraduate, graduate or staff level. Thus, this research becomes relevant because part of its aims is to understand if computing departments in the UK ethically review their projects; if any procedure currently being used is effective and if ICT researchers consider ethics reviews relevant. This will give the reader some perspectives on the current state of the art in this regard.

2.8 Conclusion

This chapter has provided the conceptual and theoretical basis for this research. There has been an exploration of the literature on ethics in ICT especially on ethics reviews of ICT and ethical issues associated with ICT research. It has also highlighted both conceptual and regulatory gaps that justify the conduct of this research. It has established that there is a dearth of literature on ethics reviews procedures for ICT research projects, and on standard frameworks for ethically reviewing such projects in the UK computing departments/faculties. This leaves one with such searching questions; are ICT research projects ethically reviewed in these departments? If they are, are the available procedures effective? Do researchers in such departments/faculties (especially the staff) consider ethics reviews (ERs) relevant for ICT research? Therefore, this research investigates the availability, effectiveness and relevance of ERs of ICT research projects in UK computing departments. In short, this study wants to establish the current state of the art in this area.

CHAPTER THREE

RESEARCH PHILOSOPHIES, METHODOLOGY AND PARADIGM

Introduction

This chapter presents the meaning of research, its different approaches, strategies and its methods. It will offer explanations of the above and also point to the methods and strategies to be employed in this research. This will put this research into proper perspective for an easier understanding of the methods of data collection and analysis that will aid in discovering answers this research has set out for.

Meaning of Research

Research is when an individual or groups of individual subject(s) questions or problems to a rigorous scientific scrutiny in order to get answers or results. In other words, it originates with a question or problem, requires a clear articulation of a goal, follows a particular procedure and expects answers or results. The Longman dictionary (1995) defines research as the studious study of a subject, which is intended to discover new facts or test new ideas; the activity of finding information about something that one is interested in or needs to know about.

The above definition finds support in Sykes et al. (1982) who defined it as the systematic investigation into and study of materials, sources, etc in order to establish facts and reach new conclusions. This definition has been widely acknowledged as very useful because it immediately focuses on the ‘‘systematic nature of research’’ (Johnson, 2008). There is a clear implication of methods in the definition which essentially provides a structure for logical arguments. Oates (2006) presents another perspective of

research as a particular kind of everyday thinking which creates new knowledge. She goes further to suggest that one can do a good job of this only when he/she applies rigour and does not jump to conclusions, but carefully find sufficient and appropriate sources of data, properly record, analyse and interpret that data. For her this will help in drawing well-founded conclusions based on the evidence.

Other definitions of research include finding answers to questions in an organized and systematic way. Research in ICT (of which this research work is an example) is therefore a systematic and organized way of finding answers to pertinent and novel questions with regard to ICT.

3.1 Research Philosophies

Underlying every research (including research in ICT) are perceptions, assumptions and beliefs of the nature and knowledge of reality that influence the way the research is undertaken from design through to conclusions (Guba & Lincoln, 1994; Hughes, 1994). These perceptions highlight philosophical issues of ontology and epistemology and ultimately help in choosing appropriate approaches to the inquiry and ensure that a researcher's biases are exposed and understood. Yet, philosophical discussions in ICT literature (especially ontology) are not always detailed. This is because philosophy is still regarded as an abstract field that defies complete understanding. However in this research, the description of the philosophical stance and approaches adopted by the researcher is considered important. Here, the researcher attempts to avoid any abstraction by using simple words to describe concepts necessary to explain adopted ontology and epistemology in this research.

3.1.1 Ontology

Like many other philosophical concepts, ontology is defined differently by so many people generating a conceptual confusion. It is derived from the Greek words; ὄν – *on* (the genitive of ὄντος- *ontos*) which means 'being' or 'of that which is' and λογία, -*logia* which means 'the study of' or 'science' (Douglas, 2010). The combination of these two meanings defines ontology as the study of being or the science of that which is. In philosophical traditions, it is developed by Aristotle in his discussions on metaphysics (a branch of philosophy) as the theory of being which deals with the nature and categories of being.

This Aristotelian 'being' is generally referred to today as 'reality' or 'phenomenon'. Therefore, ontology can be said to mean the study or science of the nature of reality. The descriptions of one's views, claims or assumptions on the nature of reality are all in the realm of ontology. In every investigation or research on reality or phenomenon, there is an explicit or implicit claim on the nature of reality. These ontological assumptions shape the researcher's view points and conclusions.

An example of an ontological view is when one sees reality as that which is experienced or observed. A dog is a dog because I observed that it walks on all four legs and barks loudly. This view is known as **subjectivism**. For the proponents of this view, reality only exists through the experience of it (Blaikie, 2007). The observer gives meaning to the reality. That means that phenomena find meaning in the various interpretations and actions of social actors. Organization as a phenomenon will then be viewed to exist as a result of the actions and interpretations of those who inhabit it.

In contrast to this view, some believe that reality exists independent of experiences. For instance, a dog is a dog regardless of who observes it or if it is observed at all. This means that reality takes precedence over experience and its meaning is independent of human consciousness (Blaikie, 2007). For its proponents, phenomena and their meanings exist in a world external to social actors. This ontological assumption is called **objectivism.** This definition means that objectivists will view organisations as tangible assets that find meaning in its rules, mission statements and hierarchies. Therefore, organization exists external to those who live in it.

This shows that there are different views on what constitutes reality. Different researches have different ontological beliefs and this research's ontology is clearly identified in section 3.4. However, ontological beliefs generate such questions as; how can reality be known? Or how can one acquire the knowledge of reality? And these are epistemological questions which are discussed below.

3.1.2 Epistemology

Epistemology is a branch of philosophy commonly known as a theory of knowledge which studies the nature and scope of knowledge (Lee, 2004; Hofer & Pintrich, 1997). It is derived from the Greek words *ἐπιστήμη* (*episteme)* meaning 'knowledge' and λογία (*logia)* which means the 'study of'. This etymology translates as the study of knowledge. It is defined by Blaikie (2007) as a theory or science of the method or grounds of knowledge. This means that it deals with how the nature of knowledge and how knowledge of reality can be acquired.

For Hatch and Cunliffe (2006) epistemology is; knowing how you can know and what you can know. It seeks to provide answers to the questions of what and how of

knowledge. Epistemology is then ‘‘taken as trying to account for how beliefs arise, how they relate to each other, and how they relate to the world’’ (Hornstein, 2007, p.146). A researcher who has an assumption of the nature of a reality will then look to epistemology to provide details of the ways of knowing that reality. This means that there is an inter-dependent relationship between ontology and epistemology. One’s epistemological position is informed by his/her ontological claims or assumptions.

Following from this connection or relationship, there are also subjective and objective epistemological beliefs. For objectivists, knowledge of reality exists irrespective of our experiences but can be discovered through experience, observation or reason. Huglin (2003) echoed this view when he wrote that knowledge of the world is relatively fixed, exists outside the knower, and that learners can definitely come to know the world as it really is. This is close to Locke’s idea of the mind as a *tabula rasa* waiting to be filled with sense impressions. Pratt (1998, p. 22) puts it this way;

> Knowledge exists independent of the learners’ interest in it, or awareness of it…basic theories, principles, and rules which govern our lives and world exist quite separately from our experience of them; knowledge about the world exists ‘out there’ waiting to be discovered.

The underlying idea about knowledge of reality is its existence out there separated from our experiences waiting to be discovered through our experiences, observations or rational thought.

On the other hand subjectivists believe that the knowledge of phenomena can be acquired through people's interpretations of them. There is a rejection of the independent existence of knowledge of reality and its discovery. Rather there is an endorsement of subjective interpretations of reality as knowledge. Thus, Pratt (1998, p. 23) writes;

> Subjectivists are committed to quite different beliefs about knowledge and truth ….knowledge is dependent upon what individuals bring to the moment of perception. Knowledge and truth are created, not discovered; the world is only known through people's interpretations of it…truth is arrived at not by seeking correspondence, but by seeking consensus; not by looking for a perfect match, but by finding a reasonable fit; not by assuming detachment but by assuming commitment. Truth, therefore, is relative rather than absolute; it depends upon time and place, purpose and interests.

While objectivists believe in the discovery of knowledge, subjectivists espouse that knowledge is created by individual interpretations removing the possibility of a value-free knowledge. This is one of the major epistemological distinctions scholars make and another which is prevalent in research is between rationalism and empiricism.

3.1.2.1 Rationalism

This is a philosophical position that believes that our knowledge of reality can be obtained *a priori* - independent of our experiences (Markie, 2008). A rationalist defends one of three beliefs; that knowledge of a phenomenon is acquired by intuition alone or by being deduced from intuited propositions; that from birth, we are endowed with the

knowledge of some truths and finally that we were born with some concepts we use in some subject areas.

These claims or beliefs agree that knowledge is gained *a priori.* However, the difference is on how this knowledge is gained and what type of knowledge is gained. On this understanding, any position that holds that we can have certain knowledge of reality independent of empirical evidence is rationalist. However, proponents of this position agree that experience is necessary in the knowledge process but not as important in the empiricist mind. Hornstein (2007, p.150) describes the rationalist's view of experience this way;

> Experience is like flipping on a light switch. Before the light switch is flipped, the pictures are invisible. Thus, light-switch flipping is necessary to the pictures becoming visible. However, flipping on the light does not fashion or form the picture but allows one to see what is there quite independently.

This metaphor renders experience a stimulus that merely reveals an existing ideas' structure in one's mind rather than a formative stimuli that structure ideas as empiricists would believe. Descartes, Spinoza and Leibniz are some of the major rationalist philosophers in history. Their rationalist epistemological positions or that of recent rationalist like Popper has influenced research in different fields of study (Cunha & Figueiredo, 2002; Ulrich, 2006; Hornstein, 2007).

3.1.2.2 Empiricism

On the other hand, empiricism is a philosophical position that denies the existence of innate beliefs or knowledge (or nativism) and asserts that knowledge of reality or

phenomenon is acquired only through sense experience (Seigfried, 1909; Carruthers & MacDonald, 1990; Markie, 2008). The epistemological stance of this position is based on the belief that knowledge is *a posteriori*- dependent upon sense experience. In no way does this empiricist thesis imply that man has only empirical knowledge. It entails that *if at all* knowledge is acquired; it is to be sense experience (Markie, 2008). In the history of philosophy, Locke, Berkeley and Hume are the acclaimed proponents of this epistemological position who were in opposition to the arguments of rationalists.

Furthermore, it is from this position that we derive the concept *empirical research* which means a research in which knowledge is gained through observation or experience. Any research that relies on the evidence collected through experience or observation is regarded as empirical. There is an emphasis on the role of sense experience in the formation of ideas. And this empirical evidence can be analysed either quantitatively or qualitatively [see section 3.2 below]. Such researches therefore rest on the epistemological foundations of empiricism.

3.2 Research Methodology

Methodology refers to a general system of principles which underline how we organize, structure and investigate the social world and also the theory of this system (Spirkin, 1983). It demonstrates the validity of the knowledge generated in research. Literarily it means the study or science of methods rather than methods themselves. Furthermore, it clearly outlines the directions and procedures used in research which increases the consistency, coherency, accountability and repeatability of ideas. Therefore, methodology comprises of the techniques, methods and procedures which are used to collect and analyse data in research.

Methodology and epistemology are closely related. While epistemology deals with the *philosophy* of how we come to know the world, methodology involves the *practice* (Trochim, 2006). This means that one's epistemological assumptions, which are influenced by one's view of reality, affect his choice of principles of practically acquiring knowledge-methodology. For a researcher therefore, understanding his view on the nature of reality (ontology) and the meaning he ascribes to knowledge and its creation (epistemology) is fundamental in the articulation of the rationale for his research design and methodology (Darlaston-Jones, 2007).

There are different ways of classifying methodologies and one of these classifications relevant for this research is the popular distinction between quantitative and qualitative study of reality. In so many texts, they are referred to as quantitative and qualitative research. It is not the aim of this section to engage in an extensive discussion on the widely discussed dichotomy between these two methods. But it will be good to note that even though these two are different, ''the logic of inference underlying both types of enquiry may be the same'' (Grix, 2001). This fact blurs the line of distinction often preached by many (Grix, 2001; Silverman, 2004). According to Yin (1994), in practice no research methodology is entirely qualitative or quantitative.

3.2.1 Qualitative Research

Literarily speaking, this refers to a set of research procedures where qualitative data are collected through empirical means and are analysed using qualitative analysis methods. It was developed in the social sciences to enable researchers to study social and cultural phenomena (Myers & Avison, 2002). It is different from quantitative research because its aim is to get information that reflects the content and meaning of a social event

through the perspectives of individuals. There is an interest in meanings, perspectives and understandings through the process of interaction with data. That means that the researcher attempts to discover meanings that participants attach to their behaviours, how they interpret events and interactions and their perspectives on particular issues of research interest. The data collected here are in the form of text (books, journal articles, web pages and documents), images (pictures and diagrams) and sound (music) (Denscombe, 2007; Grix, 2001; Moody, 2002).

Qualitative research method can easily be applied in real world settings and is therefore criticized as lacking both 'internal validity (alternative explanations of results) and external validity (usually concerned with a single case: limits generalisability to other settings)' (Moody, 2002). Also, some scholars believe that its interpretation of data is naturally more subjective than in quantitative research methods (Myers, 1997; Moody, 2002).

3.2.2 Quantitative Research

In contrast to qualitative research, quantitative research generates numerical data that can be analysed with statistical methods. In this research, the researcher finds variables for concepts, operationalising them in the study and then measures them (Grix, 2001). It originated in the natural sciences for the study of natural phenomena (Myers & Avison, 2002). Quantitative aims to determine the relationship between an independent variable and a dependent variable in a population or to establish causality. That means it is either descriptive or experimental. A more general description of reality is sought here than with qualitative method. As Grix (2001) puts it, ''statistical reliability is sought by

undertaking a random sample of cases from which generalizable results can be gleaned''. There is an emphasis on the generalizability of research results.

In quantitative research, variables or concepts are developed which in turn are measured and converted into specific data-collection techniques. These techniques produce precise numerical information which can be understood as the empirical representation of the concepts (Neuman, 2003). However, the fact that some human actions, especially behavioural phenomena cannot be measured is a standing criticism of quantitative method (Silverman, 2004).

3.2.3 Research Methods

The thread of relationship between ontology, epistemology and methodology continues in methods. While methodology deals with the question of what practical means can one use to acquire the knowledge of reality, method asks; What strategies are parts of this means? It refers to the more practical issues of choosing an appropriate research design. This can be divided into data collection methods and methods for data analysis.

3.2.3.1 Methods for Data Collection

In ICT literature, there are a number of methods for data collection. They include the following: experiments, surveys, ethnographies, case studies and action research.

3.2.3.1.1 Experiments

In this method (which Oates referred to are as a strategy), cause and effect relationships are investigated in the bid to prove or disprove a causal link between a factor and an observed outcome; cause and effect (Oates, 2006). Denscombe (2007) supports this by implying that in experiments, situations are artificially set up by the researcher to test

hypothesis which is usually in a laboratory. It is usually used to explain some kind of causation and also to predict phenomena.

Experiments demand objectivity; they use quantitative data and aim for generalizations. It assumes that there is a regularly occurring pattern or law that exists and researchers ought to find it and demonstrate it. It is a choice method in scientific research and is usually based on a positivist approach or paradigm [see discussions on paradigms in section 3.3].

3.2.3.1.2 Surveys

Zikmund (2003) gave a basic definition of survey as any method that involves asking questions of respondents. From this definition, Cooper et al. (2007) suggest that it involves two categories of data collection strategies; questionnaires and interviews. However, Oates (2006) goes beyond the above definition to describe a survey as a strategy (and not a method) which helps a researcher to obtain the same kinds of data from a large group of people or events in a standardized and systematic way. She agrees that it can involve questionnaire and interviews, but also asserts that surveys can use other data generation modes such as observations and documents. That means surveys involve both strategies that ask questions from participants and also document reviews and observation. Explanation of these survey strategies are given below.

Questionnaire: Questionnaires are fixed sets of questions pre-determined and written out for respondents or participants to complete with or without assistance (Zikmund & Babin, 2007). It usually collects either quantitative data or qualitative data. It aims to collect information from a sample of a population of interest such that the results are representative of the population within a certain degree of error. Its advantages include

that a large volume of information can be collected from many participants within a short period of time. It also collects data in different ways; telephone, internet, or in-person. Therefore, it is useful in understanding the characteristics of a large population.

Interviews: Unlike questionnaires, interviews involve a form of discussion where new questions can come out over the course of the conversation (Cooper et al, 2007). It helps the researcher to establish a base from which interpretation can be made, conclusions drawn and future courses of action determined. It is predominantly used in qualitative research. There is an emphasis on the depth of the information rather than its breath and the researcher is required to play an active role in the data collection (Wimmer & Dominick, 2006). Interviews can be structured, semi-structured or unstructured.

Structured interviews: This is where a standard and fixed set of questions are used by the interviewer in a given order to obtain information from the interviewee. Even though it can be open-ended, most often it is closed-ended with either ordered response choices or unordered response choices (Nichols, 1991). In this type of interview, there is little room for flexibility owing to the fixed and uniform questions asked all participants (Wimmer & Dominick, 2006). However, information collected here can easily be quantified but there is a little chance of unanticipated discoveries.

Semi-Structured Interviews: In this type of interview, ‘‘more or less open-ended questions are brought to the interview situation in the form of an interview guide” (Flick, 2009 p. 94). Questions asked here are flexible and open ended but are guided and directed at obtaining particular information from the participant with regard to content and themes. Participants get the opportunity to expand upon their answers, provide more details and additional perspectives.

Unstructured Interviews: This is an interview where the interviewer makes use of open-ended questions that are not structured by any standard (Nichols, 1991). It allows the researcher to probe deeper into the participants' responses at any point during the interview. The researcher's ability to determine the level of probing therefore determines the richness of the information collected. The flexibility of the questions also presents an opportunity for the researcher to discover information initially unknown to him/her.

Document Review: According to Oates (2006), this is another way of collecting information in a survey, where the researcher reviews a variety of existing documents which includes books, articles, reports, web pages and other written artefacts, with the intention of collecting independent positions of different people. Document review can provide both qualitative and quantitative data depending on the research interests.

Observation: As a survey strategy of data collection, observation involves watching and listening to research participants in order to discover particular information about their behaviour (Langley & Cubitt, 1987). There are two major types of observation which are ***participant observation*** where the researcher becomes a participant in the context being observed and ***direct observation*** where the researcher is as unobstrusive as possible.

3.2.3.1.3 Ethnographies

Ethnography has its roots in social and cultural anthropology which involves observation, recording and description of peoples and cultures through fieldwork (Myers & Avison, 2002; Oates, 2006). It involves the participation in the lives of the participants (Lewis, 1985; Denscombe, 2007). Here, the researcher gets involved in a

culture, collects data about the culture, reflects on the process of understanding in the culture, acknowledges the impacts of this culture and links everything to previous literature. It is a strategy aimed at ‘‘understanding people in their worlds, not in the artificial world of laboratory and therefore deals with multiple interpretations’’ (Oates, 2005 p. 300). The works of such scholars like Zuboff (1988) and Davies et al. (1991) present evidence that this method is appreciated and used in ICT research.

3.2.3.1.4 Case Studies

A case study research method focuses on investigating a single phenomenon in a particular context (Oates, 2006). It helps to obtain a detailed insight into a sample case and its complex relationship and processes. For Yin (1994) it is an empirical study that investigates a phenomenon when the boundaries between the phenomenon and context are not clearly evident. It is the most common qualitative method used in ICT and has been within the positivist; interpretive and critical research paradigms (Myers & Avison, 2002) [see section 3.3]. However, no matter the underlying philosophical assumptions of the researcher, in case study research, there is an attempt to shed light on phenomena through gaining a ‘‘holistic understanding of the phenomena in its natural setting’’ (Moody, 2002).

3.2.3.1.5 Action Research

As its name suggests, action research is a reflective process through which problems are progressively solved by individuals working with others in teams. The usual aim of method is the improvement of working practices by finding solutions to social problems (Oates, 2006; Lewin, 1946). Thus, Rapoport (1970, p. 499) wrote,

> Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutual acceptable ethical framework.

This description emphasizes the problem-solving and collaborative characteristics of this method. It has been accepted as a valid research method in ICT only in the recent past (Myers & Avison, 2002).

3.2.3.2 Methods for Data Analysis

There are a variety of data analysis methods used in ICT research which can be grouped into quantitative and qualitative methods. This research involves a lot of qualitative data and less quantitative data. Even though a description of quantitative data analysis is given here, concentration is more on the qualitative methods.

3.2.3.2.1 Quantitative Data Analysis

This involves any process for interpreting phenomena through numerical or statistical modelling or measurement. It assigns numerical values to variables in the bid to replicate reality mathematically. It often contains either descriptive statistics which include measures of central tendency (mean, median and mode) and the measures of variability about the average (range and standard deviation) or inferential statistics which are outcomes of statistical tests. Descriptive statistics present a picture of the data collected in the research while inferential statistics assists the researcher in drawing conclusions from the data collected. In inferential statistics, the researcher also tests hypotheses set and relates the findings to the sample population.

There are large numbers of quantitative modes of analysis that fall into two categories; interval estimation and hypothesis tests. In interval estimation, a population parameter is estimated using the sample data. However, hypothesis tests attempts to address the uncertainty of the sample estimate. It tries to refute a particular claim about a population parameter based on the sample data. Different softwares for quantitative analysis have been developed to assist researchers which include; SPSS, ROOT, PAW, KNIME and DevInfo.

3.2.3.2.2 Qualitative Analysis

In ICT, a number of valid methods of data analysis exist. They include the following;

Semiotics

Semiotics comes from the Greek word *seemeiootikee,* which means the study of signs, their representations and how we view them (Brier, 2001). As Myers (1997) states, this can be understood in two senses; one as an underlying philosophy and two, as a 'mode of analysis'. However, discussions here will centre only on the second sense.

As a method of data analysis in research, it focuses on signs, their usage and the way one understands them. The idea behind this is the belief that valid conceptual ideas can be revealed in the frequency of signs in a research activity or text (Myers, 1997).

There are different forms of semiotic analysis and these include, discourse analysis, conversation analysis and content analysis

Discourse Analysis

As Stubbs (1983) suggests, discourse analysis can be defined as (a) concerned with *use* of language beyond uttering a single sentence. (b) concerned with the interrelationships

between language and society and (c) as concerned with the interactive properties of everyday communication. Making a reference to the first meaning, Slembrouck (2005) sees discourse analysis as a linguistic analysis of natural speech or written discourse. Therefore, in a survey for example, this method of analysis aims at discovering patterns of questions and the answers received and other patterns of interaction.

Conversation Analysis

As its name suggests, conversation analysis aims at discovering the patterns and structure of an ongoing speech interaction rather than concentrate on the meanings of the utterances. Conversational patterns and structures are revealed to the researcher who immerses himself/herself in the context of the interview or other kinds of face to face conversations (Myers, 1997).

Content Analysis

Content analysis has been defined as any method that helps one make inferences by systematically identifying specific characteristics of data (Holsti, 1969). This is a broad definition considering that some scholars have narrowed their description down to textual analysis (Stemler, 2001; Myers, 1997). It enables researchers to go through large volumes of data with ease in a systematic pattern. It is useful for discovering trends and patterns in documents (Stemler, 2001). The researcher makes inferences from studying the regularities and structures that exist in texts (Myers, 1997).

Triangulation

Triangulation is a method of data analysis that synthesizes data from many sources. It represents a synthesis and integrated analysis of data from multiple sources (Myers, 1997). It combines data from both quantitative and qualitative methods in order to

provide more reliable and valid results. The idea that different methods led to the same results here, gives the researcher more confidence.

Grounded Theory

The origin of Grounded Theory is attributed to Barney Glaser and Anselm Strauss, who wrote the book *The Discovery of Grounded Theory: Strategies for Qualitative Research* in 1967 (Glaser & Strauss, 1967). This book was all about discovering theory from systematically analyzed data collected in qualitative research. It is a method of data analysis that aims at generating a theory in order to understand phenomena. (Dey, 1999) This starts with an empirical research that collects data from different strategies such as survey. The data is then analysed using coding and theoretical procedures. Thereafter, theories are inductively generated through interpretive procedure before being presented (Haig, 1995). Grounded theory is a rigorous approach that demands time, a chain of analysis and a relation of findings to other theories so as to discover a new theory (Urquhart, 2001). It differs from other methods with respect to its emphasis on theory development. Orlikowski's (2002) work is an example of the use of grounded theory in ICT research.

Hermeneutics

Hermeneutics involves the understanding and interpretation of texts (Boland, 2002). It can be understood as both an underlying philosophy (Okere, 1983) and also a method of data analysis (Bleicher, 1990). In the former sense, it provides the philosophical grounding for interpretivism but as a method of data analysis, it presents a way of understanding textual or oral data (Myers, 1997). As a method of data analysis it is associated with qualitative research. It aims at understanding the meaning of texts

through the interpretation of parts of the texts which hinges on the understanding of the whole parts, which again, can only be interpreted on the basis of the parts (Gadamer, 1975). As this is the method chosen for analysing the collated data in this research a detailed description of the meaning of hermeneutics and its applications are presented in chapter four while justifications behind the choice are detailed in section 3.4.

3.3 Research philosophical paradigms

The combinations of one's ontological and epistemological beliefs or assumptions make up ones world views. In research this is called paradigms (Oates, 2006). The word paradigm has a Greek etymology "παράδειγμα" (*paradeigma*) which means *pattern or example of something*. This etymology connotes the ideas of a mental picture or pattern of thought. For Guba and Lincoln (1994, p. 107) it ''may be viewed as a set of *basic beliefs* … that deals with ultimates or first principles. It represents a *worldview* that defines for its holder, the nature of the "world", the individual's place in it, and the range of possible relationships to that world and its parts …''.

Therefore, they are both philosophical and theoretical traditions within which researchers attempt to understand the social world (Blaikie, 2007). They provide the researchers ideas on the social world and the social experiences within the social life. Research paradigms show what the researcher 's basic beliefs about the research is; what he/she thinks of the nature of reality; what idea of knowledge he/she has and how he/she intends to acquire what he/she thinks as knowledge and what strategies he/she intends to acquire the knowledge. That means the researchers ontology, epistemology and methodology are reflected in his research paradigm.

Chua (1986), Orlikowski & Baroudi (1991), Klein & Myers (1999) and Oates (2006) discussed three distinguishing paradigms in ICT research: positivist, interpretive, and critical. These paradigms have been used to delineate different types of research. Thus, in some texts, one can see positivist research, interpretative research and critical research. This section presents detailed discussion on them.

3.3.1 Positivist paradigm

The positivist paradigm has its roots in positivism which was founded by the French philosopher and sociologist Auguste Comte (1798-1857) as an attempt to apply the methods of the natural sciences to social phenomena (Smith, 1983).

Positivism asserts that human knowledge is only based on sense experience. This means that experience is the only object of knowledge and also its only criterion (Sauvage, 1911). It is a position that believes that the goal of knowledge is to describe phenomena that we experience and that the purpose of science is to explain what we can observe and measure (Trochim, 2006). Advocates of this philosophical approach include Mach (1883), Schlick (1932), Hempel (1945), Kuhn (1962), and Lakatos (1976).

As a research paradigm, the positivist position advocates the application of the natural science principles in the understanding of phenomena. Thus Oates (2006) referred to it as an approach that underlies scientific method. Its proponents share common ontological positions which include; that reality is objective and is governed by unchangeable natural cause-effect laws; that it can be generalized and it consists of pre-existing structures or patterns that can be discovered. Also, they share epistemological positions such as; that knowledge of reality can be discovered and described in a systematic way and not created; that knowledge consists of verifiable or falsifiable

hypotheses and that it is probabilistic. Therefore, there is an assumption that the social world exists objectively [see sections 3.1.1 and 3.1.2] and that knowledge is only valid if it is based on direct observation and experience measured empirically using quantitative methods (Blaikie, 2007). It is the dominant research position in ICT research (Orlikowski & Baroudi, 1991; Walsham, 1995; Myers, 1997).

In research, a positivist would seek to discover pre-existing structures of reality scientifically and systematically describe, explain and predict it. By the unencumbered use of the human senses, objective facts about external reality are acquired through direct observation and experiment (Blaikie, 2007). The researcher believes that through a deductive process a value free understanding of knowledge of the world can be discovered. This belief rests on the empiricist epistemology and has been criticized for being inadequate when research is about how people live, view the world and cope with it (Ryan, 2006).

The idea of viewing knowledge of reality as external to the researcher and the research instruments can translate to the objectification of research subjects which highlights the question of ethics. Schratz and Walker (1995) echoed this when they pointed out that positivist positions awaken questions about the uses and purposes of research and research knowledge which are as much ethical as they are technical.

3.3.2 Interpretive Paradigm

Interpretative paradigm rests on the ideas of the interpretivism school of thought that are contrary to positivism (Walsham, 1995; Weber, 2004). Blaikie (2007) and Ryan (2006), describe it as post-positivist while Hatch and Cunliffe (2006) called it anti-positivist

paradigm. What this means is that the interpretive paradigm challenges the basic assumptions of the positivist position.

Contrary to the positivist claims, interpretive researchers believe that reality exists subjectively [see sections 3.1.1 and 3.1.2] and the knowledge of this reality is the social construction of human actors through consciousness, language and shared meanings (Walsham, 1995; Myers, 1997). There is an assumption that in the social world, individuals give different interpretations to their experiences. These multiple interpretations lead to construction of a social reality in which people live and act. Rather than discover knowledge, interpretivists believe in the creation of knowledge.

This position roots its arguments on hermeneutics and phenomenology (Boland, 1985; Weber, 2004). It rests on the ontological assumptions that reality is subjective and therefore socially constructed; that people experience reality differently and that a particular reality is defined by language. Epistemologically, interpretivists believe that knowledge is based on observable phenomena but beyond that on subjective beliefs and that knowledge is constructed [see section 3.1.2]. Unlike the positivist belief, reality and the individual that observes it cannot be separated. This means that value-free knowledge is not possible because of the presence of both the researcher's pre-understandings and the interpretations given by individuals in the knowledge process or research (Walsham, 1995). Thus, one can say that it is a position that values *values* (Ryan, 2006).

The interpretive researcher seeks to understand the different meanings and interpretations given to the social world by individuals in the context of the researcher's

own experience. Conclusions are drawn only when individuals' interpretations have become clear to the researcher. Hence it is inductive.

Interpretive research focuses on the full complexity of our sense-making abilities as the knowledge of reality emerges (Kaplan & Maxwell, 2005). Thus. Walsham, (1993, pp. 4-5) writes that in ICT, this approach is ''aimed at producing an understanding of the context of the information system and the process whereby the information system influences and is influenced by its context''. This often involves using qualitative methods. Nevertheless, a research approach is not necessarily interpretative just because the data collected is qualitative (Berntsen et al., 2004). According to Klein and Myers (1999), the key task of this approach is seeking meaning in context which means that the subject matter ought to be set in its social and historical context so that how the situation emerged can be clear to the reader. It offers the researcher the opportunity to assume a learning role through self reflection and the consideration of the feelings of the participants.

3.3.3 Critical paradigm

Another research paradigm recently gaining voice in academic circles is the critical approach. The ontological assumptions of this position is that reality possesses objective properties or structures that tend to dominate our experiences which include social, political, cultural, economic, ethnic and gender-based forces (Myers, 1997; Oates, 2006; Cohen & Crabtree, 2005). Also, there is a belief that people can construct and reconstruct their own world through action and critical reflection. Epistemologically, critical researchers claim that knowledge is constituted by the lived experience and the social relations that structure these experiences and that knowledge emerges in the act

of critique in a dialectical process of deconstructing and reconstructing the world. Thus, critical research focuses on the social critique of restrictive structures in the world (Myers, 1997). There is no separation between what we know and our experiences.

The critical paradigm opposes the value-neutrality of positivism by advocating that researchers ought to take a position and share responsibility for social changes (Comstock, 1982). The role of research here is emancipation rather than the discovery of an objective knowledge that is value-free. It seeks to identify oppositions, conflicts and contradictions in the contemporary society which ultimately helps in to empower people to eliminate causes of alienation and domination (Myers, 1997; Kim, 2003; Oates, 2006)

There exists a diversity of critical tradition in the social sciences, but the development of critical paradigm is attributed to the Frankfurt school (*group of German-American theorists who developed powerful analyses of the changes in Western capitalist societies that occurred since the classical theory of Marx*) and dominated by the work of Habermas (Geuss, 1981). Other notable critical theorists include Horkeimer, Adorno and Marcuse. Recently, there is a gradual emergence and enactment of a critical tradition in ICT research. This fact is offered credence by a number of special conferences (Critical Management Studies 1999, 2003, 2005, 2007, 2009 and the recent one held in Naples from 11th to 13th of July, 2011; Americas Conference on IS 2001) and workshops (the Critical Research in IS workshops hosted by the University of Salford in 2001 and in Galway in 2008) devoted to critical approach to research.

Like any other research field, research in ICT can be shaped with the above philosophies [see section 3.1] methodologies [3.2] and paradigms [3.3]. With an

objective ontology and epistemology, mostly quantitative tools are used to conduct positivist research in ICT. Examples include the numerous ICT experiments happening in computing laboratories across the UK universities. On the other hand, the interpretive ICT research (which has increased in the recent past owing) use subjective ontology and epistemology to shape research designs. In this research, specific ontology, epistemology, methodology and paradigm have been adopted and the section below presents them and the justification for adopting them.

3.4 Chosen Philosophies, Methods and Paradigms for this Research and their Justifications

This research explores the different perspectives on ethics reviews of ICT research projects in the UK so as to understand its current state of the art. To achieve this involves understanding the actions, meanings and interpretations of those who use ERPs in the UK University-based computing departments (i.e. administrators, staff and students). This relies on the ontological assumption that phenomena is experienced, observed and find meaning in the interpretations and actions of social actors. Also there is an underlying epistemological claim that knowledge of this reality (ERs of ICT research projects) is created instead of discovered and it can be acquired through the interpretations of those who experience it.

In this research, there is a reliance on evidence gained through experience (reading with eyes and listening with ears). Therefore, it qualifies as an empirical research that makes use of both qualitative and quantitative methods for data collection. A questionnaire is used here to gain information about the characteristics of the large population (staff in all the UK computing departments) with the intention of enriching the qualitative

research method of interviews. This is because quantitative data can be of great value to a researcher who is attempting to draw meaningful results from qualitative methods (Abeyasekera, 2005). The qualitative methods used for data collection are documents review and interviews. There was an extensive review of available documents or literature in ERs which provided different perceptions of different scholars on the subject area. Semi-structured interviews were then used as a major source of primary data collection so as to gain in-depth views from the participants. The researcher believed that interviews would ensure the quality and depth of the data collected by providing adequate information that would help in the understanding of the statistical results of the questionnaire.

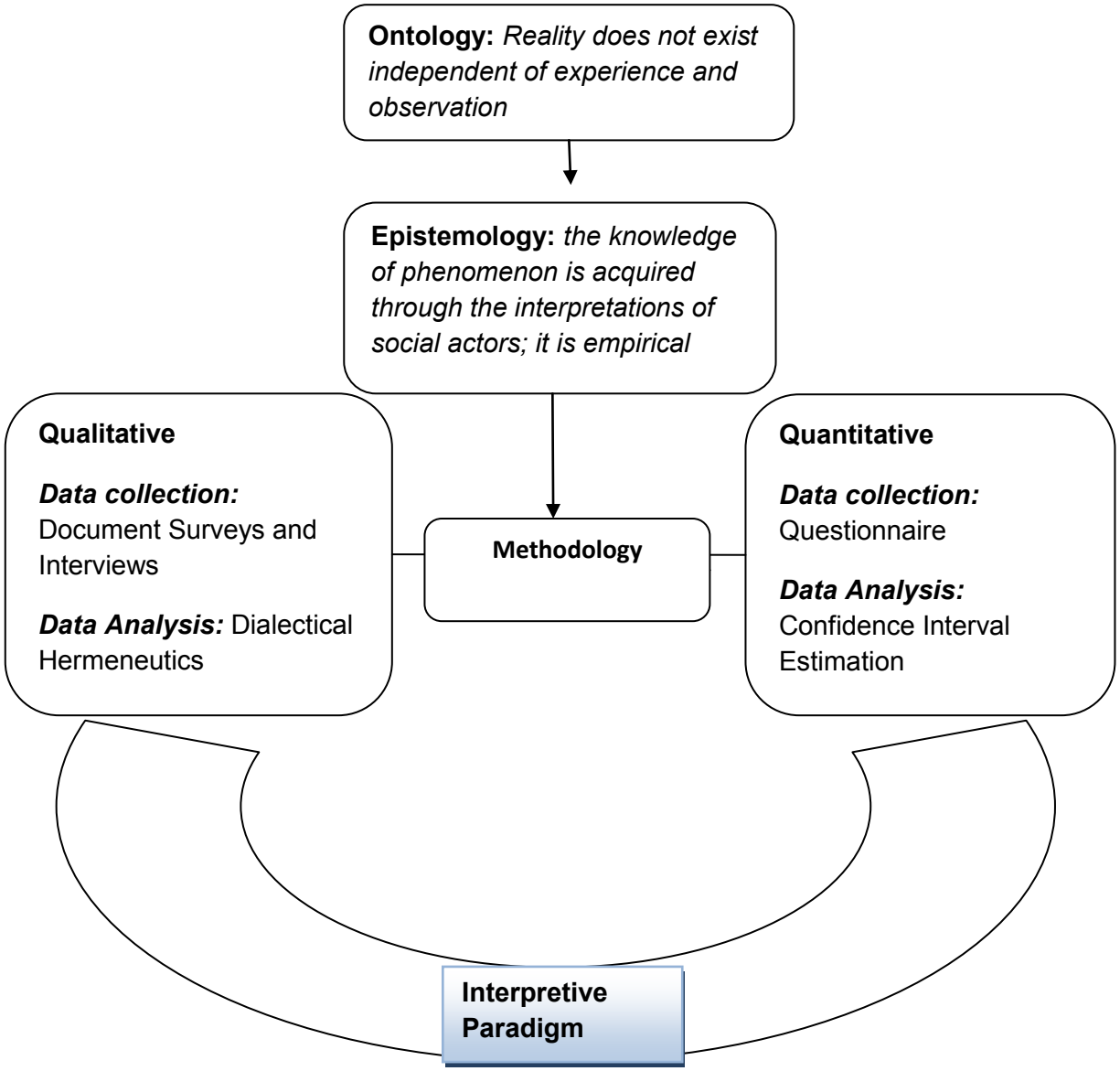
The combination of the above ontology, epistemology and methodology indicate that this is an interpretive research because the knowledge of ERs in the UK computing departments is a social construction created by the interpretations and meanings given and shared by administrators and staff of UK computing departments. What is produced is a value-laden knowledge made of different interpretations given by individuals. The obvious consideration of the participant's views and feelings here offers the researcher the opportunity to learn through self-reflection.

And this idea of learning through self-reflection is the hallmark of hermeneutics which is the data analysis method for qualitative data which is adopted for this research. Other methods that could have been considered here include discourse analysis, conversation analysis, content analysis and grounded theory. However, hermeneutics was chosen because it is grounded in philosophy and enables a much deeper understanding of people's views and also the researcher's. The role of the researcher's pre-

understandings and their explicit acknowledgement in hermeneutics form part of its appeal.

Furthermore, to analyze the results of the questionnaire, a statistical model of interval estimation would be used. This quantitative tool is largely used in positivist research. Thus, even though this research is an interpretive research it employs some positivist tools. Some scholars assert that these two paradigms are different, irreconcilable and cannot be combined in research (Luthans & Davis, 1982; Morey & Luthans, 1984; King et al, 1994; Lincoln & Guba, 1985). Lee (1991) refutes the widely held notion and suggested a framework for integrating both approaches in organizational research. Lin (1998) agrees with Lee and opined that the combination of these two paradigms add substantive content that neither paradigm can create alone. It balances the biases each approach suffers separately. The intention is then to provide an enriched content that each paradigm could not have offered separately. This research makes use of positivist tools which offer statistical inferences that would enrich the knowledge base of the researcher. This is aimed at ensuring a better understanding of the interpretations the social actors in the context give to the phenomenon and does not translate to a detailed combination of positivist and interpretive approaches.

Figure 3.1 Chosen methods and paradigm



3.5 Conclusion

In summary, it has been made clear that the knowledge of the phenomenon of ethics reviews of ICT research projects cannot be acquired independently from the interpretation and meanings given to it by those who use it or are supposed to use it. This belief rests on the assumption that reality does not exist independently from experience and observation. The reality in this research (ERs) is studied through the qualitative method of survey through documents' reviews, interviews and questionnaire. It adopts an interpretivist paradigm that relies on some positivist tools. The adoption of the qualitative analysis of dialectical hermeneutics highlights the research's interpretive approach. The next chapter presents an elaborate discussion on hermeneutics; its origins, applications and the justification for its choice.

CHAPTER FOUR

DIALECTICAL HERMENEUTICS AND ITS APPLICATIONS

Introduction

This chapter contains detailed discussions on dialectical hermeneutics. For a clearer understanding, descriptions of the component parts of this concept, that is, dialectics and hermeneutics are offered in Sections 4.1 and 4.2. These descriptions crystallize into a reasoned understanding of dialectical hermeneutics and its applications both in previous research and in this research.

4.1 Dialectics

Dialectics is a concept that has its origin in ancient Greek philosophies but believed to have been given new life by the works of Hegel, and later appropriated by Marx and Engels. (Marx & Engels, 1970) For Hegel, 'dialectic' is the method by which human history unfolds - history progresses as a dialectic process. In research also, logical arguments progress as a dialectical process of thesis, antithesis and synthesis (Johnson, 2009).

4.1.1 Historical Background

Dialectics has a long and rich history. It has its origin in ancient society, both among the Greeks (such as Zeno, Socrates and Plato) and the Chinese (like Lao Tzu). In ancient Greek society, the term was used literarily to mean a method of thinking by means of dialogue, discussion, debate or argument (Gomperz, 1920). Its beginning is often attributed to Zeno of Elea. Eleatics such as Parmenides used this method to defend their understanding of nature against the arguments of the Heraclitan school of thought

(Kemerling, 2000). In the 'dialogues', it was evident that while Socrates understood dialectics as questioning and conversation, Plato regarded it as a logical and systematic method for understanding transcendental reality. Aristotle was also known to have often used this concept in his works, even though he regarded it as inferior to a logical reasoning that aims at theoretical knowledge.

Modern philosophy saw narrower applications of this concept by notable German philosophers. In his *Critique of Pure Reason,* Kant (1934) used the term 'Transcendental Dialectic' in the bid to expose the illusion of judgments that attempt to transcend the limits of experience. George Wilhelm Friedrich Hegel applied dialectic to the logical method of his philosophy to mean the fundamental process of development in both reality and thought, which proceeds from thesis, antithesis-which consists of negations of the thesis and synthesis-which embodies what is essential in each (Hegel, 1969) This system of logic is the foundation of what we call Dialectics today. He represented the whole world, a natural, historical and intellectual world as a process and it is only through the process of dialectics, (i.e., thesis, antithesis and synthesis) that we can arrive at its knowledge. For example, Hegel in 1812 described his dialectic of existence in the *Logic.* First, he explained existence as pure Being (thesis) which is found to be indistinguishable from Nothing (antithesis). This Being and Nothing are in turn united as Becoming (synthesis). This process helps one to understand then why old organisms die as new organisms are created or born. In research, this 'triad' ultimately helps the researcher to validly make a contribution to knowledge through a sound logical process and this research is no different.

Marx and Engels rejected Hegel's absolute ideas and termed him idealistic. They suggested a different kind of dialectic method called 'dialectical materialism'. This method of dialectics understood nature as real in its own right and does not derive its reality from any supernatural source (Marx & Engels, 1970). They accepted his notion of dialectic as an inexorable process of development in thought, nature and history but rejected his idealistic orientations. Marx and Engels believed that they were putting Hegel back on his feet because his ideas portrayed him as one ''standing on his head''. This dialectic method ''is not only different from the Hegelian, but is its direct opposite'' (Marx, 1887).

4.1.2 Thesis

This Hegelian Being means different things to different people. In Aristotelian logic, this means the first proposition used as a premise in a syllogism (Runes, 1942). However, it has come to be used as any proposition that can be supported by reasoning. In research therefore an intellectual proposition put forward by the researcher or discovered during data collection is regarded as a thesis.

4.1.3 Antithesis

Literarily this means opposition to the thesis. It represents proposition or arguments that challenge the thesis. It is the negation of the positive proposition that gives rise to the emergence of a third stage of the dialectic process (Ibid). In research, there are positions that are in complete contrast to either the researchers' proposition or some positive positions discovered during a research process. These negative positions constitute the antithesis in a research work.

4.1.4 Synthesis

This is the third phase of the dialectical process which combines the partial elements of the thesis and the antithesis. It is the resolution of the apparent contradiction between the thesis and antithesis. This is done by the reconciliation of their common truths and formation of a new proposition that will be a valid contribution to knowledge. This research – within the wider method of dialectical hermeneutics - explored some thesis and antithesis, drew out their commonalities and ultimately developed a final position in the conclusion [see section 8.1].

4.2 Hermeneutics

Hermeneutics is a word that derives its roots from the Greek verb *ερμηνευειν* (hermeneuein), which means *to interpret* and its derivative *ερμηνεια* (hermeneia) meaning *interpretation* (Demeterio, 2001). It has some etymological relationship with the name of the Greek god 'Hermes', a messenger of the Olympian gods who interpreted the wishes of the immortal beings to mortal beings. The history of this word goes back to ancient Greek philosophers - Plato, Aristotle and the Stoics. Plato in a number of his dialogues contrasted hermeneutic knowledge to that of Sophia while Aristotle named his work on logic and semantics Peri hermeneias (*De interpretatione* in latin) which means *On Interpretation.* In this work, hermeneutics is a general theory of understanding (Ricoeur, 1981).

With medieval thinkers such as Augustine and Aquinas, this term became an exegetical, expository, interpretive process applied to written texts and in particular scriptures (Demeterio, 2001). This understanding of hermeneutics as exegetical praxis included theories of symbols, analogies and significations, and reflected in the works of

Augustine and Aquinas whose influences on modern hermeneutics have been widely acknowledged by Dilthey, Heidegger, and Gadamer.

4.2.1 Classical Methodological Hermeneutics

In modern times, hermeneutics experienced an underlying shift in meaning; from exegetical praxis to a more critical and foundational evaluation of interpretation itself; from methodologies of interpretation to a theory, or epistemology, of interpretation (Demeterio, 2001). It was Friedrich Daniel Ernst Schleiermacher (1768-1834), a German protestant theologian and philologist, who began this development by focusing on the problems of interpretation with his adaptation of hermeneutics as a distinctive humanistic and historical discipline (Ramberg & Gjesdal, 2005). This transformed hermeneutics into a philosophical anthropology. Schleiermacher saw hermeneutics as an approach to derive understanding from texts especially religious texts (Bleicher, 1980). His hermeneutics comprised of two different approaches: a grammatical approach and a psychological approach (Bleicher,1980; Olson & Carlisle, 2001).

The grammatical approach emphasizes the importance of understanding linguistic context of the text, in the general understanding of the text (Webb & Pollard, 2006; Olson & Carlisle, 2001). Schleiermacher believed that a strong focus on ones language use, grammar and individual application gives a better understanding of texts. His belief that 'humans have the ability to view an object from another human's perspective and so understand that object from that same perspective' highlights his use of a psychological approach to hermeneutics (Olson & Carlisle, 2001; Dilthey 1979).

After Schleiermacher, came Dilthey, who studied Schleiermacher very extensively and was hugely influenced by him, prompting many to group them together as Romanticists. He became the first to adapt hermeneutics to a general theory of human life and existence (Dilthey, 1989). This helped him to provide an important distinction between human sciences and natural sciences. He differentiates human science or what is known today as humanities (disciplines that deal with *Geisteswissenschaft*) - as the sciences of 'understanding' from natural sciences, *Naturwissenshaften* which he termed the sciences of 'explanation' (Ibid). Dilthey's emphasis on the distinction between understanding (*Verstehen*) and explanation (*Erklaren*) defined his approach to hermeneutics and differentiates him from Schleiermacher (Ramberg & Gjesdal, 2005). He is widely known as developing Schleiermacher's ideas into a systematic and methodological hermeneutics (Demeterio, 2001). Hermeneutics thus, turned to be a 'humanities methodology, broader than exegesis' (Ihde, 1999).

4.2.2 Philosophical Hermeneutics

In his work *Sein und Zeit* published in 1927, the German philosopher Heidegger gave hermeneutics an ontological turn (Ramberg & Gjesdal, 2005). With Heidegger, hermeneutics became not just the method of textual or linguistic understanding and interpretation, but also a method of understanding the nature of being (*Dasein*); highlighting a shift from the theory of interpretation to a theory of existential understanding (Webb & Pollard, 2006; Mallery et al 1987). He is a major proponent of dialectical hermeneutics [see section 4.2.3].

In his work, *The Basic Problems of Phenomenology (1927),* Heidegger posited that our understanding of beings and their **Being** emerges through phenomenology which he

defined in another book *Being and Time* (1927, 7c) as ‘‘... to let that which shows itself be seen from itself in the very way in which it shows itself from itself’’. This was in rejection of Edmund Husserl’s ideas of phenomenology who Heidegger believed bracketed questions of being or ontology. It is claimed that for Husserl, consciousness together with the intentionality of consciousness was the subject-matter of phenomenology (Gorner, 1997). But for Heidegger it is ***Dasein*** or the understanding of being which led to his ideas on hermeneutics.

According to Heidegger, understanding is a mode of ‘Being’- an important characteristic of beings (Ramberg & Gjesdal, 2005). This ‘understanding’ finds a structure in a hermeneutic ‘‘triumvirate of time-meaning-Being’’. (Cole & Avison, 2007). ***Being*** referring to the way humans come to know reality and implied in the meaning of Being is the idea of ***time***; understanding reality depends on the degree of pre-understanding which comes from experience (time). These pre-understandings are in turn very important in the attainment of ***meaning*** of new phenomena (Ibid). This highlights the central point of Heidegger’s hermeneutics; his concept of fore-structures of understanding.

According to Bleicher (1980), Heidegger saw three fore-structures of understanding which included fore-having, fore-sight and fore-grasping. Demeterio (2001) explained that while fore-having represented a broad general view of reality, fore-sight points to a level particular to a phenomenon under study but also at a general level. However, fore-grasping he said, refers to a detailed understanding of the phenomenon under study. This Heideggerian concept of fore-structures gave rise to new thoughts on the hermeneutic circle (Ramberg & Gjesdal, 2005; Web &Pollard, 2006).

As a student of Heidegger, Gadamer followed in the philosophical turn evident in Heidegger's hermeneutics (Olson & Carlisle, 2001). He saw hermeneutics as a practical philosophy that attempts ''to clarify the conditions in which understanding takes place'' (Gadamer 1975, 263). For him, hermeneutics is far from being a method but is a way of life (Webb & Pollard, 2006). This idea of practical philosophy was influenced by Aristotle's taxonomy of sciences (Olson & Carlisle, 2001).

Central to Gadamer's hermeneutics are his notions of the conditions in which understanding takes place. These conditions include prejudices and fore-meaning (Ibid). He rejected objectivism since it was his belief that all human understanding is majorly influenced by one's prejudices; which are subjective (Gadamer, 1975; Bleicher, 1980). As Gadamer explained, his idea of prejudice carries the positive notion of *pre-judgment* rather than the negative connotations commonly associated with it (Gadamer, 1975:358).

According to Negru's (2007) assertion, Gadamer's past (represented by prejudice and tradition) has a ''truly pervasive power in the phenomenon of understanding''. Gadamer argues that this does not come easy for the interpreter but is linked to a horizon in which understanding takes place. He elucidates this point as follows;

> ''understanding is not to be thought of so much as an action of one's subjectivity, but as the placing of oneself within a process of tradition, in which past and present are constantly fused'' (Gadamer 1975, 258).

Also Gadamer believes that this understanding can only be achieved when the interpreter masters the language because the world is revealed to us through language (Olson & Carlisle, 2001; Webb & Pollard, 2006).

The German philosopher and critical theorist, Jürgen Habermas presents a number of objections to ontological hermeneutics especially to Gadamer's hermeneutics (Negru, 2007; Nickelson, 2009; Webb & Pollard, 2006). Habermas' aim was to improve the practice of hermeneutics by increasing its critical focus. He started by contesting the universality of hermeneutics proposed by Gadamer which he referred to in his discussions on the universality of language. Language, according to Habermas is distorted by subconscious factors and is also a 'medium of domination and social power' (Negru, 2007). This in turn brings about distorted communication and therefore defeats the fact of universal hermeneutics on the basis of universal language.

Furthermore, Habermas rejects the fact that 'prejudices or pre-judgements' can qualify as valid knowledge (Nickelson, 2009; Negru, 2007). For him, acceptance of pre-judgements as valid forms of knowledge constitutes deference to authority/tradition as valid sources of knowledge. Traditions for Habermas are systematically distorted and therefore produce a type of communication which falls short of the ideal (Nickelson, 2009). This renders traditions as unreliable sources of valid knowledge.

Together with the above contentious points, Habermas introduced an important concept that resonates with critical thinkers today - the critique of ideologies (Negru, 2007). The Gadamer-Habermas debate is an important one for the concept of hermeneutics. An attempt to reconcile these two opposing views was made by Paul Ricoeur. He highlighted the complementary nature of ontological and critical hermeneutics by demonstrating that there is a bridgeable gap between them (Webb & Pollard, 2006). He acknowledged the importance of both views but suggested a unifying view in his critical hermeneutics.

Ricoeur agrees with Habermas that the ‘‘critique of ideology is the necessary detour which self-understanding must take’’ (Ricoeur 1981, 144). But this does not mean discarding tradition and historical texts because understanding is ‘‘formed by the matter of the text and not by the prejudices of the reader’’ (Ibid). These texts for Ricouer include written discourse and also human actions. He also attempted to deconstruct Dilthey’s dichotomy between Explanation and interpretation (Bleicher, 1980; Ricouer, 1981). Thus, Ricouer’s hermeneutics is commonly referred to as phenomenological hermeneutics (Webb & Pollard, 2006).

4.2.3 Dialectical Hermeneutics

Dialectical hermeneutics is the type of hermeneutics this research adopts. Its major proponent is Heidegger, who combined Hegelian dialectics and Schleiermacher’s hermeneutics to construct a new philosophy of understanding and interpretation. For him, phenomenon can be understood when existential meaning instead of a new meaning is sought through a hermeneutic dialectic. He acknowledged that interpretation cannot be attained without ones’ presuppositions. Gadamer’s hermeneutics was developed on these foundations. Both of them believe one’s presuppositions or prejudgments are imposed on ‘texts’ or ‘objects of understanding’ revealing various horizons of meaning and the two enter into a dialectical movement called the ‘hermeneutic circle’. This concept then offers in detail the explanation of dialectical hermeneutics.

4.2.4 Hermeneutic Circle

The idea of the hermeneutic circle emanated from the original insight of Schleiermacher (Reeder, 1985; Stiver, 1996). For Schleiermacher, words must be examined in relation

to the full sentence and the sentences in the contexts of the paragraphs and so on until understanding is reached. On the other hand, we cannot understand the individual parts without some grasp of the whole. The idea of 'circle' therefore is a metaphor to explain the dynamic movement between the 'parts' and the 'whole' of a text when seeking understanding (Annells, 1996). It implies a back-and-forth movement between the parts and the whole which represents the art of understanding (Annells, 1996) [see figure 4.1]. Schleiermacher evidenced this in his reference to grammatical interpretation in the following way: ''the vocabulary and the history of an author's age together form a whole from which his writings must be understood as a part'' (Schleiermacher 113).

This idea of circle was evident in the works of subsequent hermeneuts such as Dilthey and also in the work of Heidegger who gave it an ontological dimension through his notion of *Dasein* and fore-understanding (Gadamer, 1975). According to Cole & Avison (2007), Heidegger suggested a hermeneutic circle of unconscious understanding and situated behaviour. However, Annells (1996) credited Gadamer as the one who successfully brought the concept of the hermeneutic circle to the fore of philosophical hermeneutics.

This process of interpretation implies ultimately that understanding of a phenomenon arises through the establishment of the relationship between the 'parts' and the 'whole'. For example, at the mention of the word 'sports', the understanding of which 'sport' referred to is only determined when we consider specific aspects given to him; how many people are involved, the surface and the kits? Twenty two players wearing boots kicking a ball around a pitch will reveal that 'football' is the 'sport'.

Therefore, a familiar (i.e 'present-at-hand') phenomenon implies that the researcher 'will possess prejudice-laden pre-understanding of it (Cole & Avison, 2007). In Schleiermacher's hermeneutics, this pre-understanding generally referred to the interpreters 'prejudice' which becomes an important part of the process of interpretation. Heidegger referred to it as 'fore-structures' or 'fore-knowledge' which includes *lived experiences* of the *Dasein.*

Strengthened by 'Cartesian doubt', 'prejudice' gained a negative meaning during the enlightenment. Gadamer (1975) refutes this negative connotation by preferring to use its original meaning of 'pre-judgement' which means 'a judgement that is given before all the elements that determine a situation have been finally examined'. He goes further to underline its importance by insisting that to try to eliminate one's own concepts in interpretation is not only impossible, but manifestly absurd (Gadamer,1975). This means that prejudice is important in a hermeneutical situation as a backdrop from where understanding emanates. These are our preconceived notions of reality arising from our past experiences.

In a hermeneutic circle, the researcher through a dialectic process of enquiry with the phenomena will identify the parts for a better understanding of the whole (Cole & Avison, 2007). This creates a movement of understanding from the 'whole' to the 'parts' and back to the 'whole'. To understand existing knowledge and not the discovery of new knowledge thus, becomes the aim of this circle, according to Heidegger. The aim is not the pursuit of one best interpretation but rather the co-emergence of perspectives that result from an active merging of boundaries by the researcher and participants. These perspectives are what Gadamer referred to as

'horizons of understanding' and the merging of boundaries he conceptualized as 'fusion of horizons' (Gadamer, 1975; Cole & Avison, 2007). It is also noted that in a research, important minor hermeneutic circles can also occur. This ought not to be confused with the major circle even though the minor circles are very relevant in establishing the relationships involved in the major one.

The attainment of this fusion or '*Verstehen'* becomes the end to which the researcher strives. According to Cole & Avison (2007), understanding here is to understand differently from the initial concepts of either the participant or the researcher. The complete immersion in the data and the identification of prejudices then become important means to this end.

4.2.5 Applications of Hermeneutics

Hermeneutics has been applied in many areas of study, such as law, medical sciences, business and many fields relating to human behaviour, in different forms (Olson & Carlisle. 2001). Examples of such usage include Sherman (1988) who wrote on the hermeneutics of law, Erben (1993) who reviewed extensions of the hermeneutics of Dilthey in the field of biography. There was also Svenaeus (2001) who wrote of the Hermeneutics of Medicine and the phenomenology of Health. In business, Llewellen (1993), Arrington & Francis (1993), Arnold & Fischer (1994), Ket de Vries & Miller (1987) and Brown (1995) have all applied the hermeneutic idea or called for its usage.

These show that hermeneutics can be a useful method of analyses across a range of academic fields. One of its major points is that it encourages our world view to be holistic instead of the atomist view of logical positivism (Olson and Carlisle, 2001). However, despite its wide applications in some areas of study, hermeneutics is 'neither

well accepted nor much practiced in Information Technology research' (Cole & Avison, 2007). Butler (1998) cited a paucity of information on hermeneutic applications as the reason behind this. This research then aims at offering methodological contributions to the existing body of knowledge.

4.2.6 The use of Hermeneutics in Information Technology Research

Unlike many qualitative approaches, hermeneutics has rarely been used in ICT research. However, some scholars have attempted to point out the usefulness and importance of this approach. Myers (1995) put forward dialectical hermeneutics as a theoretical framework for IS implementation research. Cole and Avison (2007) reaffirmed its potential through the description of a research investigating notions of convenience in home internet shopping using the hermeneutic circle.

Noting that few hermeneutic ideas are used in the evaluation of case studies in information systems, Klein and Myers (1999) provided a set of principles for its usage with a philosophical rationale. This was also the reason behind Boland et al (1994) proposing hermeneutics as a framework for better understanding the group process supported by group support systems. Olson & Carlisle (2001) also pointed out the Gould (1994) 'demonstrated the use of hermeneutics to the design of a geographic information system'. There were also discussions on the application of hermeneutic methods in geographic information systems in Powell's (1999) work on library and Information science. In addition to the above applications, Lee (1994) extensively demonstrated the use of hermeneutics in his study of the impact of emails as a communication medium.

Furthermore, significantly for the present research, Standing and Standing (1999) employed multiple interpretations using dialectical hermeneutics in the analysis of the role politics in the promotion of IS career progression. These examples give credence to the fact that considerable effort has been made to apply hermeneutic methods and principles in IS research.

4.3 Stages of the Hermeneutic Process

As a research method, hermeneutics can be applied in a way that can shape both the research design and the data analysis. This can be done by distinguishing the different stages of the research. This procedure was discussed and used by Cole & Avison (2007). In their research, they applied a six-stage process that started with the 'explication of prejudices' to 'the fusion of horizons'. This research adopts these stages in ways that are suitable to represent accurately the thought process involved here.

4.3.1 Stage One: Identifying prejudices

In his hermeneutic principles, Gadamer (1975) strongly advocated the continual striving to identify ones prejudices or prejudgements. For a researcher using hermeneutics, this is the first stage of research which involves the clarifications of one's presuppositions or the explication of prejudices. Cole & Avison (2007) argue that this is similar to what Miles & Huberman (1994) called the process of data reduction when masses of data are transformed into useful and condensed forms of intelligence (Denzin & Lincoln, 1998; Silverman, 1998).

According to Cole & Avison (2007), this helps the researcher to understand his interpretive lens better before data collection and analysis. Thus, they developed a two-stage process that can help the researcher in this process. The first stage involves

techniques drawn from Cognitive Therapy where a series of reflective questions are posed to uncover dominant motivations and interests of the researcher. On the other hand, the second stage involves the creation of a level of critical self-awareness of the researcher's interpretive horizons.

These two stages are strongly acknowledged in this work but it is also noted that both stages independently can achieve the aim of assisting the researcher in the identification and explication of his prejudices. While the first stage uses the rigorous self-reflective assessments of cognitive therapy, the second employs the critical analysis of self-awareness. For the purposes of this research, only the second stage is applied.

This level of critical self-awareness can be gained by entering into dialectic with the literature chosen for review through a deconstruction of 'the whole' into individual 'parts' (Cole & Avison, 2007). There is a need therefore, for the researcher to engage himself/herself with these questions; 'What values are being supported by arguments under review and do they challenge my perceptions?' 'Does the reviewed literature accurately constitute my worldview?'

4.3.2 Identified Prejudices in this Research

This research employed the Cole and Avison's second stage of identifying prejudices independently. The researcher gained a level of critical self-awareness through providing answers to such questions; what part of the literature review constitutes my worldview? What values or experiences do I have that challenges my perception of either the 'whole' or the 'parts' of this research?

After putting all experiences into perspective, the researcher identified the following important prejudices that play roles in this process of interpretation and understanding.

- With a philosophy degree and experience in ethical theories, the researcher leans more to Kantian ethics than any form of consequentialism.
- The researcher believes that ethics review is an obligation every researcher ought to value.
- This led him to believe that all computing departments ethically review their research projects.

These prejudices form the initial position of the researcher on the phenomenon or reality (which is ethics reviews of ICT research in UK Universities) and their identification plays a part in drawing the line between the discovered knowledge of this reality [see table 7.1 and section 8.1] and the researcher's pre-judgement. The researcher uses these prejudices or prejudgements to impose some structure on the research through formulated lines of enquiry [see section 4.3.3 below], which ultimately leads to enriched knowledge of the reality.

4.3.3 Stage Two: Formulating Lines of Enquiry

As mentioned earlier [see sections 4.2.4 and 4.3.1], the identified prejudices form an important backdrop for understanding. Their explicit identification and the knowledge gained from the literature are used to formulate lines of enquiry that keep the research process in the right focus (Cole & Avison, 2007). These lines of enquiry would then help the researcher to determine the 'parts' that would form key themes for discussion during the data collection. Cole and Avison (2007) put it succinctly when they pointed out that they serve as reference criteria, impose structure on the research design and ultimately ensures consistency across subjects, time periods and different analytical stages [see figure 4.1]. It equips the researcher during data collection to identify

unnecessary and superfluous data. For example during interviews, discussions can drift off the mark. This structure will help the interviewer to rein the discussion back to focus. The researcher's interpretive response to data is governed by these criteria. New data is weighed against what was understood before. It offers the link between the different stages of analysis of the hermeneutic circle: from deconstruction to analysis and also to interpretation (Cole & Avison, 2007).

Myers (2009) posited that this structure imposed by the deconstructed 'parts' rests on the researcher's theoretical position which is evident as his/her prejudgement. Therefore, these parts are specifically determined by the researcher to be key elements of the 'whole' (Cole & Avison, 2007). However, using the researcher's prejudgement to determine these parts is not intended to provide a better understanding of the researcher's world-view. Rather, it forms part of the process to move beyond the researcher's pre-judgement to a shared understanding between the researcher and the research participants regarding the phenomenon.

As noted in section 3.1.1, the subject of investigation in research is referred to as reality or phenomenon. In formulating the lines of enquiry for this research, there was a major reference to the researcher's prejudgement which is informed by his philosophical understanding of reality and also to the research question. As Aveling (1909) opined, the basic aspects of reality (which includes the reality under study) are essence and existence. Essence being the ground from which properties of a reality emanate and existence is the actuality of the reality. It has been established that the reality under study here is the ethics reviews of ICT research in UK universities [see sections 1.2 and 1.3]. Therefore, to investigate and understand the reality in this research, questions on

its essence and existence are necessary. In this research, the researcher starts with a question on essence which is; Do ICT researchers in the UK universities consider ethics reviews relevant to what they currently do or what they are capable of doing? This question is intended to provoke answers that would help in understanding why there should/should not be ERs for ICT research in the UK universities.

Furthermore, the researcher then asks questions on existence of this reality which are; are ethics review procedures or any form of ethically reviewing ICT research available in the UK universities? A follow up question from this (which is still on existence) then is; if ethics review procedures for ICT research are available in the UK universities, are they currently effective? Knowledge on the existence of ERs of ICT research in the UK universities and the nature of this existence are intended to be provided in answers to these questions. Together with the question on essence, these questions became the lines of enquiry undertaken by this research. From the above lines of enquiry, the parts emerged thus; *availability, effectiveness and relevance.* As 'parts' of a 'whole', the researcher does not claim that these are the only parts that can be identified of the whole. Rather, it is considered that the shared understanding of these parts will provide adequate knowledge of the phenomenon that would answer the research question. As an interpretive research, it is acknowledged that reality is observed by different people from different ways. This research is not intended to understand the reality under study from all the different ways of its observation. It seeks to use these determined 'parts' as the backdrop of the interpretations of the 'whole' which are provided by the participants.

The whole research is therefore testing the *availability, effectiveness and relevance* of ERPs for ICT research in the UK universities. These 'parts' and the formulated lines of enquiry [see table 4.1] were then used to get the initial understandings of the phenomenon during the questionnaire stage.

Table 4.1 Formulated lines of Enquiry and identified parts

Formulated Lines of Enquiry	Identified parts
Do ICT researchers in these universities consider ethics review procedures relevant to what they do?	Relevance
Are ethics reviewing procedures or any form of ethically reviewing ICT research available in the UK universities?	Availability
If ethics review procedures for ICT research are available in the UK universities, are they currently effective?	Effectiveness

4.3.4 StageThree: Active Interview

The identified themes from stage two become relevant during the interviews which were semi-structured and active. The themes or 'parts' inform the discussions between the interviewer and the interviewee. The interview thus becomes an active conversation between two people about themes that define the 'whole' of the research.

Quoting Holstein & Gubrium (1995), Cole & Avison (2007) pointed out that this 'active interview' is unstructured or semi-structured and considers the interviewer and the interviewee as equal partners in constructing meaning around an interview event. However, even though it is unstructured, it is directed using a schedule with the listed themes. This helps the interviewer to explore beyond the 'surface of superficial responses' to discover in-depth meaning and values the interviewees assign to the various themes.

In an active interview therefore, to understand the different interpretive standpoints resulting from interviews, a rapport conducive to the sharing of information is required between the interviewer and the interviewee (Dewalt et al, 1998). Cole and Avison (2007) referred to this as empathy; ‘‘a heightened level of self-awareness derived from the articulation of prejudices’’. This does not translate to accommodating answers too readily which breeds non-reflexive passivity that undermines our contribution to the way interpretive understandings are made (Baker, 1998). Rather it should aid in the appreciation of the intentionality of meaning of the set themes offered by the interviewees. In this research, this was a major strategy for data collection.

4.3.5 Stage Four: Data analysis through codes

After the generation of a large quantity of data through interviews, how to condense the data into manageable forms becomes a problem (Williamson & Long, 2005). In Cole and Avison’s hermeneutic stages, this is done by using the themes identified and used for data collection (availability, relevance and effectiveness) as codes for data analysis. After a reflective reading of the transcribed interview texts and perceived reactions during the interviews, connections within the data are identified and the data is categorised using the codes. This offers a structured and systematic description of the phenomena and its constituent parts. Thus, with the constant consideration of the researcher’s pre-understandings, the categorized data are analysed as it supports or contradicts these pre-understandings of the codes (Cole & Avison, 2007).

4.3.6 Stage Five: Breakdown in Prejudices

According Cole & Avison (2007) the attainment of shared meaning in this process of interpretation and understanding requires the researcher to expose held views to

alternative lifeworlds. However, such exposure and appreciation of alternative views and beliefs may result in the 'breakdown' of the researcher's 'understanding about a particular issue or theme'' (Ibid). This is not and should not be seen as negative. It marks an important part of data analysis because it provokes action from the researcher.

It is the stage of re-assessment of one's perceptions of a particular phenomenon or theme. The researcher deconstructs his understandings in the light of the new information before him/her. The understanding of the new information or world views come to light in the context of what the researcher already knows. It involves a reductionist approach which Cole & Avison (2007) explain this way; ''phenomena are (artificially) restricted to finite set of occurrences or issues that can be explained, and subsequently, understood''.

At this stage, partial or incomplete construction of meaning and explanations emerge. For a complete construction of a new explanation of the phenomena, the researcher can engage in further interviews. In such interviews there will be attempts to develop incomplete understanding about some previously taken for granted aspect of the phenomena (Cole & Avison, 2007).

4.3.7 Stage Six: Fusion of Horizons

The achievement of the fusion of horizons or *Verstehen* is the aim of the final stage of this framework. And this is achieved when there is an emergence of structured and organized shared meanings from the researcher's prejudices and the available alternative world views. For Cole & Avison (2007), it denotes the emergence of new concepts that transcend originally held meanings. For them, this transcendental meaning is what represents fusion.

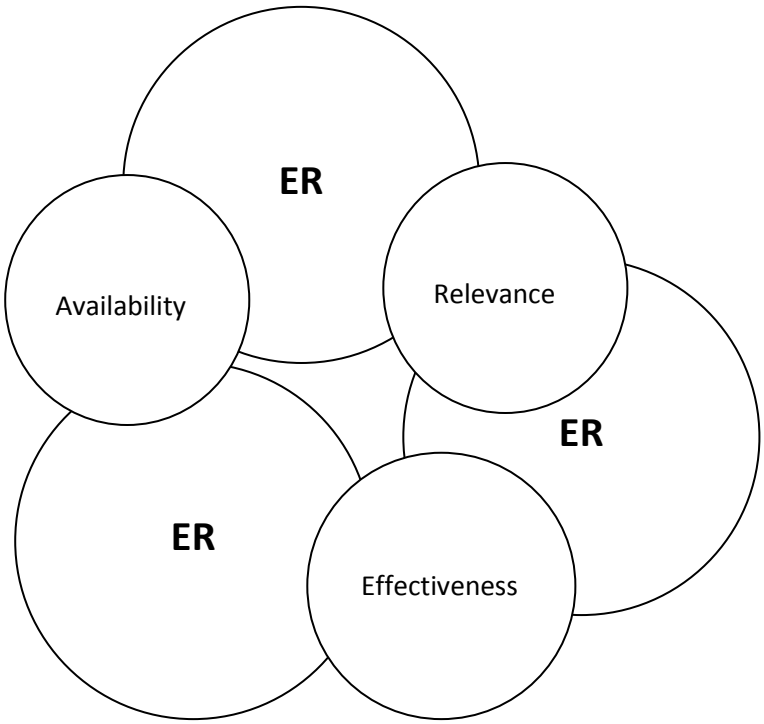
They went further to indicate that partial fusions may occur during the cause of the research [see section 7.1]. This happens when it relates to specific identified themes or parts and provides a richer understanding of the 'part' in the context of understanding the 'whole'. The researcher therefore must take care to distinguish this from *Verstehen* which represents the ultimate fusion of horizons between multiple and complex issues that constitute the phenomenon as a whole (Cole & Avison, 2007). *Verstehen* defines the level where interpretation of meanings reveals itself. However, as Cole & Avison (2007) pointed out, interpretation of data does go beyond data analysis but continues to the level of presentation and discussion of that data.

4.3.8 Application of Hermeneutic Circle in this Research

From the above discussions, the 'whole' of this research is the ethics reviews of ICT project in the UK universities especially the computing departments and the identified 'parts' are availability, effectiveness and relevance [see section 4.3.3 and figure 4.1]. Throughout this research therefore, there is a constant back and forth movement between understandings of the 'whole' and the 'parts'. This movement was evident during the data collection strategies employed- the questionnaire and the interview. It offered the platform for the different horizons of understanding to emerge.

However, there were other minor hermeneutic circles in the research. Among these circles, only one was prominent and evident during the interview. Collated data revealed different 'parts' of the issue of relevance. On a minor scale therefore, relevance became a 'whole' with different 'parts'. Insights from this circle assisted in establishing the relationship between relevance as a 'part' and the 'whole'- ER

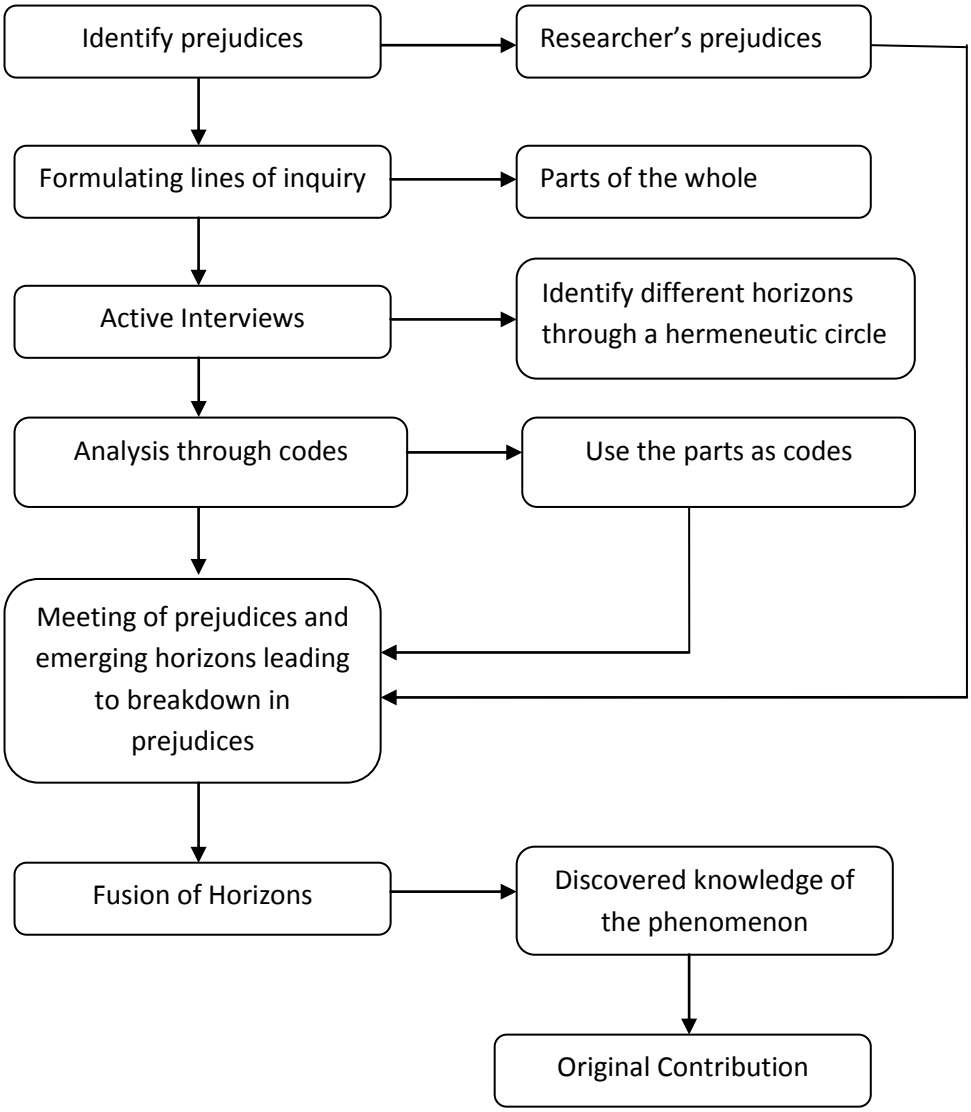
Figure 4.1 the hermeneutic circle: the parts and the whole



4.4 Conclusion

A detailed discussion on dialectical hermeneutics has been presented in this chapter which demonstrates theoretically how this method can be used in this research; given the reader an opportunity to understand the hermeneutic journey embarked upon in this research. The history and some vital explications have been explored. Also, there were discussions on the previous applications of hermeneutics both as a research method and as a research theory especially in ICT. The different hermeneutic stages [see figure 4.2] used in this research which were adopted from Cole and Avison's work have been explained leading to discussions on the step-by-step plan of the hermeneutic circle. These discussions have identified that the researcher is not embarking on a personal journey to understand his prejudices better [see section 4.3.3] but only uses his prejudgements to give a structure to an interpretive understanding of the shared meaning of the reality under study through the exploration the participants' interpretation of the reality. The next chapter demonstrates the research methodology in application.

Figure 4.2 Stages of the hermeneutic process leading to contributions



CHAPTER FIVE

DATA COLLECTION PROCESS

Introduction

This chapter presents the procedures adopted for data collection in this research. From the first steps of selecting the questionnaire [see section 3.4] participants to the active interviews, the thought process of the entire data collection is presented.

5.1 Selection of participants for the Questionnaire

Understanding the current state of the art in ERs of ICT projects in UK universities entailed reaching out to the majority of the computing departments/faculties in the UK. To achieve this, a Google search for the names and internet links of all the UK universities was embarked on. A list of computing science schools/faculties/departments of 102 UK Universities was compiled. This list was later confirmed by other official lists on UCAS website and the 2008 Times ranking of the UK Computer Science departments.

Individual departments/faculty/school websites were visited. Participants were selected from these computing departments/faculties. Staff positions were taken into consideration. Therefore the target group included departmental deans, professors, administrative staff, senior lecturers, lecturers and research students. Among all the universities staff lists of 97 universities were accessed and finally, a total of 1076 [see table 5.1] participants were selected. (Staff lists on the website of the remaining five universities were not accessible.) Relevant contact details which included names and email addresses were collected and documented.

5.2 Ethical Consideration

Ethics Review (ER) was seen as very important in this research. Before any data was collected from participants for both the questionnaire and the interview, the researcher sought the approval of the Faculty's Human Research Ethics Committee (FHREC) [see appendix C]. In accordance with the procedure, the ER form (ERF) was completed and ethical questions of privacy, confidentiality, informed consent and data protection considered. Mechanisms for answering these ethical questions were put in place and approval was granted [see appendix C]. These mechanisms included that the researcher informed the participants in detail of what the research is about, to what purposes their contributions would be used and how the data would be stored. This was done through the provision of a written document with project descriptions to the participants. The participants were made aware of their right to voluntarily answer the questions or pull out of the process even when answers had already been provided.

During the interviews, the permission to record was also sought from the participants. All participants granted this permission, and data were subsequently anonymized in this research to ensure privacy especially confidentiality. This anonymization also stems from the fact that the researcher would want to entertain the freedom to criticise participants' viewpoints. The researcher's ideas are presented here without direct reference to any identifiable participant.

5.3 About the Survey Questionnaire

Using information from literature review, a survey questionnaire was developed. This questionnaire was designed to collect data that would present statistics on the current state of the art in the ERs of ICT research projects in the UK universities. The results

from this exercise assisted in the development of adequate lines of enquiry for further data collection through active interviews.

Twenty one questions were constructed in this questionnaire. These questions were formulated around the major research questions that were aimed at getting answers on the three factors of: availability; relevance; and effectiveness [see section 4.3.3]. The questionnaire was divided into five sections. The first section included questions one to five and was aimed at getting demographic statistics and also contained general questions on whether ICT research actually raise legal, ethical and quality problems. The second section (questions six to nine) was centred on availability of ERPs in the UK computing departments. Section three (questions 10 to 12) asked questions on effectiveness while section four (questions 13 to 15) consisted of questions on relevance. The final section (questions 16 to 21) contained questions that were aimed at the provision of names and contact details of the participants who were willing to have further discussion in an interview.

This questionnaire was designed on a survey website. Detailed information about the questionnaire and the website link were then sent by email to the participants individually. The participants were individually addressed in the emails [see appendix A for a blank copy]. An electronic copy can also be found at http://www.zoomerang.com/Survey/U2MU9JEYGC9Q

It should be noted that this questionnaire was sent out twice during the research process. Initial results, from the first questionnaires sent out, formed the basis for a report represented in the HEA [see section 1.1] annual conference in 2009. The first questionnaire was sent out within the first six months of the project to 220 participants.

Out of this number, 30 completed responses were received from 28 universities. After the report, the researcher sought to improve this figure by sending it out to a wider audience. It was then sent out to 856 more participants out of whom 34 completed responses were received. The results presented in this thesis are the combined figures from both times the questionnaire was sent out.

Also, when emails for the questionnaire were sent out, very hostile responses were received from many of the target group. Most of these were upset with the fact that they had been contacted about the project, while some were totally disinterested and did not want anything to do with the research [see appendix E for samples of correspondences]. This goes some way towards explaining why the result sample figures were on the low side [see section 8.7].

5.4 Profile of Respondents

Even though there were a total of 165 visits to the survey website, completed responses were received from 74 participants from 49 Universities [see tables 5.1 and 5.2]. A mix of old and new universities participated, ranging from the top-ranked universities to the ones at the lower end of the rankings. There was also a mixture of different positions in a typical computing department/faculty represented. This offers insight into the knowledgability of the sampled population.

Table 5.1 Number of universities selected for participation

Number of UK Computing Schools/faculties/ Departments	**Number of Universities from which target participants were drawn**	**Inaccessible staff list on website**	**Targeted Participants**
102	97	5	1079

Table 5.2 University positions of the respondents

Postition	**No. Of Respondents**
Dean	1
Administrative Staff	3
Ethics Committee Chair	1
Heads of Dept.	9
Professors	11
Lecturers	38
Research Associates	3
Reader	3
PhD Students	5
Total	74

5.5 Rationale for Choosing Questionnaire

Looking at the available literature on the social reality of ethically reviewing ICT research, there is little information on its availability, relevance and effectiveness in the UK computing departments. There was a need therefore to fill this knowledge gap so as to allow the researcher to have a solid foundation for a hermeneutical journey. A questionnaire was chosen to enrich the researcher's knowledge base on the formulated lines of inquiry before the active interview. It equipped the researcher with adequate knowledge and understanding of the research object so as to ensure an effective interview. In the questionnaire, respondents were asked to indicate their interest to grant in-depth interviews. Therefore, it also provided details of the actual participants for the interview.

There is a large number of computing departments in the UK. The questionnaire serves as an effective means of collecting data from potentially large number of respondents. It is also the belief that this will increase the reliability of data since all the respondents are asked the same questions. The purpose therefore was to provide uniformity across the sampled universities. The choice of an internet survey was also informed by the fact that it allowed the researcher to access a large population without restrictions on geographical locations (Smith & Leigh, 1997). It guarantees fast response by providing a quick delivery of the instrument (Oppermann, 1995; Litvin & Kar, 2001).

5.6 Selection of participants for Interviews

Data from the questionnaire provided information for the selection of over half of the participants for the interview. Seven respondents indicated their interests and willingness to grant interviews. Further details of the research was sent to them and

dates were arranged a month before the interviews. The choice of the questionnaire participants was to continue with participants whose interests have been awakened by the research. This is because active interview is more effective if participants are speaking about themes out of interest (Holstein & Gubrium, 1995).

An additional four participants were added to this list after they expressed their interests in the research and their willingness to participate in it. All participants range from heads of department to senior lecturers in computing departments/faculties in UK universities. However, one participant was from the Faculty of Health Sciences (Chair of the Faculty of Health's Human Research Ethics Committee) who provided relevant data on the relationship between ERs in ICT and biomedical ERs.

5.7 Conducting the Interview and the rationale for choosing Interview

The active interview employed was semi-structured [see appendix B for samples of transcribed interviews]. The participants were informed about the themes to be discussed prior to the interview. However, the researcher did not limit the questions to these themes because the participants were allowed to add other opinions which could lead to new questions and issues.

Each of these interviews was regarded as an important stage of the hermeneutic circle. Therefore, new issues that emerged from the initial interviews enriched the researcher's knowledge base of the research object and therefore provided information for subsequent interviews. This means that data analysis began with the first interview giving rise to a constant interplay between collection and analysis. This aided the hermeneutic movement between the parts and the whole [see section 4.2.4].

This was a major reason for choosing this method of data collection-interview: it has the capacity to constantly enrich the data collected while the collection is in progress. During the data collection, a sequential analysis begins and constantly shapes the ongoing data collection (Pope et al, 2000). It also offers the researcher the opportunity to discover any deviation in the research focus.

5.8 Hermeneutic Circle in Action

As mentioned in section 4.2.4 the hermeneutic circle depicts the back and forth movement from the 'whole' and the 'parts'. This was evident during the interviews. Discussions moved from the ethics reviews of ICT research projects to the individual parts such as availability, and back to the whole again. It offered the researcher an opportunity to understanding the participants' views on the parts in the wider context of the whole. Initial questions were on the participants' general views of ethics reviews of ICT research projects. Gradually, it moved to the different themes or parts, one at a time, which offered the researcher circles of reflection. The aim of this, however, was not to unearth new knowledge but to understand the existing knowledge of the participants better. The interviews were an avenue of exposing the researcher's prejudices or values that ultimately increased his levels of understanding of the phenomenon. There was, thus, a co-emergence of perspectives that culminated in the fusion of horizons both partial fusions and the *verstehen* [see section 8.1].

5.9 Data Saturation

Data saturation procedures which are mostly used in grounded theory allow the researcher to flag data values above a given limit as saturated (Straus & Corbin, 1990). This was important for this research and was thus adopted, because the hermeneutic

circle has the tendency to go on and on. In this research two procedures determining the stage of data saturation were adopted. The first was based on the research question. The research question defines the scope of a research. Therefore, when results are considered enough to answer the research question, the researcher deems it necessary to stop. Finally the second was more of a self-critical awareness. Interviews were continued until the data collected became repetitive presenting a complete lack of new insights.

5.10 Conclusion

This chapter has presented the detailed step-by-step action taken during the data collection. It identified the rationale behind choosing questionnaires and interviews and also the criteria for the selection of the participants for both the questionnaire and the interviews. There was discussion on the consideration of ethical problems associated with this research and on the practical development, the continuation of the hermeneutic circle and the procedures used by the researcher to decide the saturation point. The collected data from these procedures are then analysed in the next two chapters.

CHAPTER SIX

ANALYSIS OF THE SURVEY QUESTIONNAIRE

Introduction

The questionnaire yielded some statistical data which provided further information for the interviews. Even though this was not the major source of data collection for this research, the data it provided proved vital. The Confidence Interval Estimation (CIE) model of analysis was used to analyse and to offer an insight into the collected statistical data. Thus, this chapter contains a detailed description of CIE. It also presents the results and the application of CIE on the results on ER's availability, relevance and effectiveness. The statistical inference involved in this confidence estimation informed the researcher of the social reality of ERPs in the UK computing departments and contributed to the foundation from which this dialectical hermeneutic journey was built on.

6.1 Confidence Interval Estimation for Proportion

This is a procedure that assists a researcher in achieving statistical inference. It enables the researcher to estimate either a population mean or a population proportion (Berenson & Levine, 1986). With a single sample, conclusions are drawn about the population which indicates a line of inductive reasoning [see section 3.2.3.].

Within every sample result, an important question always arises; what is the exact proportion of the result given the entire population? Given the fact that studying the entire population is always both impossible and inappropriate, this procedure offers an

opportunity to estimate the range of the proportion. Thus confidence interval is defined by Last (1988, p.171) as;

> A range of values for a variable of interest constructed so that this range has a specified probability of including the true value of the variable. The specified probability is called the confidence level, and the end points of the confidence interval are called the confidence limits'.

This means that given the results available, it provides a range for the researcher's best estimation of the likely result within the actual population. Conventionally, confidence interval is set at the level of 95% which means that there is a 95% likelihood that the true proportion resides within the range created. Put differently, it can also mean that you can be 95% certain that the truth is somewhere inside a 95% confidence interval (Sackett et al, 1991). Apart from the statistics it offers, this procedure provides additional information owing to its inherent inductive logic.

Confidence intervals can be used in the estimation of a known mean and an unknown mean. However, in this research it is used specifically to estimate the proportion of the actual population given the sample size. Seventy four participants completed the questionnaire on the availability, effectiveness and relevance of ERPs for ICT projects in the UK. This procedure is used to estimate the proportion of the actual population (all staff in computing departments in the UK) from the sampled population. To do this, the researcher used a standard equation which is

$$Ps \pm Z\sqrt{\frac{Ps(1-Ps)}{n}}$$

Where

Ps = sample proportion

P= population proportion

Z= critical value from the normal distribution

n= sample size

Using this equation the population proportion was estimated with the sample population discovered during the questionnaire and the sample size. Therefore;

Ps = the number of respondents who answered yes to the question relating to each factor measured

p = the entire population of staff in the UK computing departments

Z = 95% confidence interval which is 1.96% and

n = 74

6.2 On Availability

To ascertain the level of availability of ERPs in the UK computing departments or faculties, the respondents were asked this question; does your department/faculty have an ethics review procedure or other ways of ethically reviewing ICT research projects? Out of the 74 completed questionnaires [see section 5.4], 55 respondents answered 'Yes'. To have a 95% confidence in estimating the true population proportion therefore, a confidence interval estimate can be set using the above equation.

Ps = 55/74 = 0.743. With a 95% confidence level Z = 1.96

Then we have

$$Ps \pm Z\sqrt{\frac{Ps(1-Ps)}{n}} = 0.743 \pm (1.96)\sqrt{\frac{(0.743)(0.257)}{74}}$$

$$= 0.743 \pm (1.96)\,(0.0508)$$

$$= 0.743 \pm 0.0996$$

$$= 0.6434 \leq p \leq 0.8426$$

Therefore, it can be estimated with 95% confidence that between 64.34% and 84.26% of the staff in the UK computing universities believe that there is the existence of ERPs or some way of ethically reviewing ICT projects in their departments or faculties. This not only provides information on how the sampled population answered but an estimation of how actual population would have answered.

Furthermore, when these participants were asked to make available the links to their ethics review procedures, more results were revealed. These websites were visited and further data were collected. 100 percent of the websites provided showed that these *available* procedures are the same ones used in either psychology or medical sciences of the universities [see appendix D for visited websites].

This shows that computing departments/faculties adopt the available ethics review procedures from other departments. It also supports information from the reviewed literature which showed that no specific procedure for ICT projects have been established in UK computing departments. Instead of developing ethics review procedures suitable for ICT projects, the practice of using procedures suitable for other disciplines remains prevalent.

Another question asked about availability was; do all your faculties/department research projects go through the ethics review board procedures or do you review specific

projects? 40 respondents answered that their ERPs review only specific projects while twelve said all their projects are reviewed. The rest indicated that they do not know. Using the same model a 95% confidence interval estimation of the proportion of the population who would answer specific projects was set between 42.74% and 65.45%. This implies that the true figure of the computing departments or faculties who ethically review only specific projects is between this estimation ranges. It also shows that only a smaller percentage agrees that their departments review all projects.

These findings suggest to the researcher; that there is a likelihood that some UK computing departments do not have any way of ethically reviewing their research projects, that the available ethics review procedures are borrowed from other disciplines and that a smaller percentage of the universities review all their research projects rather than specific projects. These were completely new understandings when compared to the researchers identified prejudices.

6.3 On Relevance

On the issue of relevance, this question was asked; do you think ERs of ICT research projects are relevant? 70 respondents answered yes. Using the same equation as above, a 95% confidence interval estimation is set this way;

Ps = 70/74 = 0.946. With a 95% confidence level Z = 1.96

$$0.946 \pm (1.96)\sqrt{\frac{(0.946)(0.054)}{74}}$$

$0.946 \pm (1.96)\ (0.0263)$

0.946 ± 0.0515

=

$$0.8945 \leq \square \leq 0.9975$$

This means that with 95% confidence we can conclude that within the actual population, between 89.45% and 99.75% lies the correct proportion of who believe that ERs for ICT research projects are relevant. This represents a very high percentage but also highlights the fact that not everybody believes in its relevance.

To the researcher, these findings revealed that there are people in the UK computing departments who do not see the relevance of ERPs in their research. Since the researcher's pre-judgement was that ERPs are relevant in ICT research, this presented a different understanding. Thus the reasons why these two groups either believe in or reject its relevance were explored during the interview [see section 7.3].

6.4 On Effectiveness

To identify the level of effectiveness of any mode of ethically reviewing ICT research projects, this question was asked; do you think your institution's ethics review procedure has been effective so far? 32 respondents answered YES, 4 answered NO and 38 indicated that they do not know. Similarly, CIE can be used to establish a true proportion of the population according to the distribution of these answers. For the respondents who answered YES, the proportion can then be;

$$0.432 \pm (1.96)\sqrt{\frac{(0.432)(0.568)}{74}}$$

=

$$0.432 \pm (1.96)\,(0.0576)$$

=

$$0.432 \pm 0.1129$$

=

$$0.3191 \leq \square \leq 0.5449$$

From this one can then say that the true proportion of the population who believe that the present ERs of ICT research projects are effective is between 31.91% and 54.49%. On the other hand, the true proportion of the population who do not know is between 40.01% and 62.79%. The later represents a higher percentage of the population. This means that even though a good number of the population believe that it is effective so far, a higher number are ignorant of the level of its effectiveness. This presented the researcher with a different understanding and finding out the reasons behind these numbers formed relevant themes for the interview.

6.5 On ICT research raising Ethical, Legal and Quality Concerns

Apart from these questions directly linked to the research's lines of inquiry, there was also a question on whether the participants think that ICT research projects raise ethical problems, legal questions or quality concerns. For ethical problems 58 respondents answered yes, eight answered no, while six ticked that they did not know. 56 respondents agreed that ICT research raises legal questions; nine each said no or that they did not know. On quality concerns, 56 respondents said yes, seven said no and ten answered that they did not know. With CIE therefore, we can deduce with 95% confidence that the true proportion of the population who thinks that ICT research raises ethical problems is between 69.03% and 87.77%; and with the same figure of 56, it is between 65.92% and 85.48% for those who think it raises legal questions and quality concerns.

For the researcher these results demonstrated that majority of the population believe that ICT research raise problems in ethics, law and quality. However, there is also a significant number of the population that either does not believe it does or is still ignorant of the problems it raises. Those who believe it does raise problems represent a position close to the researcher's pre-judgement that ICT research raises various problems on ethics. The position of the latter presents a new understanding on ICT research and there were questions regarding this during the interview.

6.6 On Recommendation

For additional information towards further data collection the respondents were asked; would you recommend that all computing departments in the UK establish ethics review procedures suitable for ICT projects? 45 of the respondents indicated their willingness to recommend it while 29 noted that they would not recommend it. From this result, a CI estimation of the proportion of the population who would recommend ERPs for all the UK computing departments/faculties is calculated as between 49.67% and 71.93%. Following from his pre-judgements, the researcher was willing to recommend ERPs for all computing departments, but the significant percentage that was not willing to recommend it presented a relevant issue that was also explored during the interview.

6.7 Implications of the Findings

The above estimated proportions offer insights for further exploration because the results provided enriched this research's lines of inquiry. There is a strong demonstration that some form of procedure for ethically reviewing some or all ICT research projects exists in some of the UK computing departments. However, there is no evidence to show that these procedures are specific to the discipline of computing.

Secondly, it highlights the fact that there is a small percent of the population who do not believe ERPs are relevant for ICT research projects. It also indicates that the issue of its effectiveness is open to question since significant number of the respondents has no information on this. Finally, a good percentage of the population are willing to recommend the establishment of ERPs in all the UK computing departments and faculties.

Owing to the evident dearth in literature on this topic, these results presented the researcher with the initial knowledge of the phenomenon as it is. The above inferences demonstrated the meanings the participants' (who are ICT researchers) give to ERs of ICT projects with regard to availability, relevance and effectiveness. Ultimately, they enriched the researcher's knowledge on the research themes and equipped him well for the interviews. Also as mentioned in section 5.3, there were a lot of negative responses (in the form of threatening emails) from targeted participants. Since the questionnaire was aimed at enriching the researcher's knowledge base on the social reality of ERPs in the UK computing departments, these reactions became important foundations of the researcher's hermeneutic progress. This was because the researcher entered the interview stage with an additional objective of finding out if it was the delivery mechanism of the questionnaire or the subject of ERs that elicited such reactions.

6.8 Conclusion

A presentation of the quantitative analysis of the questionnaire results using confidence interval estimation model has been done in this chapter. It contains the meaning of CIE and the estimated proportions of the results which included availability, relevance and effectiveness of ERPs of ICT research in the UK universities. Further discussions on the

above statistical inferences were also presented with the implications of the results for the interviews conducted. Equipped with the nature of opinions ICT researchers in the UK computing departments have on ERPs through interval estimations, there was need to explore these perspectives in-depth through interviews which are analysed in the next chapter.

CHAPTER SEVEN

ANALYSIS OF THE INTERVIEWS

Introduction

Equipped with the formulated lines of inquiry [see section 4.3.3] and the varied understandings from the questionnaire, the researcher entered into the interview stage. The participants were confident and enthusiastic enough to offer their opinions on the availability, relevance and effectiveness of ERPs in the different institutions. The analysis of these interviews is presented in this chapter according to the different themes discussed. This includes the various themes that emerged on Relevance, their meaning and the researcher's appreciation or criticisms. Sections 7.2 and 7.3 present understandings on availability and effectiveness while 7.5 contains lessons that can be learned from bio-medical science ERPs which followed from the interview granted by a participant from the medical sciences. Key quotations that represent the views of participants on these themes are presented here and to avoid unnecessary repetition of views, only a few quotes for each view are presented here.

7.1 Application of Dialectical Hermeneutics

Prior to the interviews, the researcher formulated three lines of inquiry using the identified *parts* of the *whole* involved in this study [see section 4.3.3]. The interview questions were grouped under these *parts*: relevance, availability and effectiveness of ERPs. As shown in the transcribed interview in Appendix B, the interview questions and the answers provided moved from one *part* to another within the broader context of the phenomenon. After the interviews, the researcher read through all the answers provided on each part to identify and distinguish the different horizons of understanding

(or minor parts within the parts) that make up that part. These identified understandings of the parts are then weighed up against the researcher's prejudices to distinguish between the thesis and anti-thesis. At this stage, the researcher's prejudices broke down and there was an emergence of some synthesis or fusion of horizons. For each part, there were partial fusions which gave birth to a better and sophisticated knowledge of the parts as compared to the researcher's pre-understandings.

On relevance, the participants provided answers that highlighted concepts that are associated with ethics or ethical theories. For instance, a participant provided this answer to a question on relevance;

...it is a legal obligation and part of the social responsibility of the researcher (participant 4)

In ethical parlance, this view highlights the idea of duty. Therefore, the researcher goes further to broaden the participants' viewpoints by offering an insight into what duty and other concepts ethically mean and also makes a point of establishing the relationship between the broader view and the views of the participants on the concept. The contextual understanding of this concept of duty is then identified through a review of literature after which the researcher offers an appreciation or criticism of the concept. Other concepts that emerged on relevance are; trust, compliance, risk-assessment, sustainability and impediment.

On availability, rather than concepts, (as in the case of relevance) different perspectives on the nature and characteristics of the available ERPs emerged together with a general view of their availability. This explains the different structure of presentation of the findings on both lines of enquiry [see sections 7.2, 7.3 and 7.4]. Evident horizons of

understandings on availability were: current ERP's unsuitability, its nature as a tick-box process and also a process that starts and ends only at the beginning of the research project. Also the data on effectiveness did not produce concepts but different views on or reasons why current ERPs are either effective or ineffective. Despite the differences in the structure of presenting the findings on the three different lines of enquiry in this research, the dialectical hermeneutic progression is the same.

7.2 Understandings on Relevance of Ethics Reviews of ICT Research Projects

During the interviews, questions on the issue of relevance as a 'part' in the 'whole' of this research were asked. There was a focus on the key concepts emerging from the responses given by the participants. These key concepts and their links in the narrative are highlighted here. Then the ethical theories behind them are identified to understand the participants' interpretations of ERs in the present context. There was a short explanation of these concepts with the help of available literature. This helps in putting the participants' responses into perspective. The initial question on relevance included; *do you think that research in ICT raises ethical problems, quality concerns or legal questions?* This question evoked a lot of responses as noted below;

Ehm! I believe there might be some quality problems but there are little or no ethical issues. ...from my experiences, I have not met with any legal problems yet. (Participant, 8)

Another participant agreed with this point when he said;

I don't know of any legal issues but surely there are some ethical and quality problems. (Participant 3)

Others had this to say;

I have no clue about the ethical issues... I am aware of some quality concerns and just a bit about legal problems. (Participant 5)

Yes, it raises some problems on ethics and quality and recently, some legal questions. (Participant 2)

The above answers demonstrate that only the minority of the participants agreed that ICT research raises all three problems of ethics, quality and legality. But other participants believed that it raises either one or two of the problems.

Therefore, these findings suggest that research in ICT raises one, two or three of these problems; ethics, quality and legality. This puts the questionnaire result into perspective [see section 6.3].

Following from here, another question was put forward to the participants; *do you think ERs are relevant in ICT research projects?* From the first answer to this question, a series of concepts that offer significant description of what the participants think of its relevance began to emerge. These concepts include; duty, trust, risk assessment, sustainability, compliance and impediment. They offer important insight into the ethical disposition of the participants. These concepts were deciphered from quotations given by the participants during the active interview. In this section, there will be a detailed discussion on them, stating the collected arguments for and against them while weighing them against available literature.

7.2.1 Duty

A good number of those interviewed felt that a researcher in ICT has a moral, legal and social obligation not to harm the man, society and the environment. There is a belief that the increasing convergence of ICT projects with other disciplines has increased the involvement of human subjects in research. Also there is a significant interest in developing technologies that have impacts on people's self-perception as well as other complex and new technologies. Evidence of this can be found in the following statements made by the participants;

ICT research can have significant impact on people's self-perception. Where this is the case, ethical reviews to minimise potential negative impacts ought to be a legal or moral requirement. (Participant 2)

Similarly, another participant said;

Just like any other research, research in our department raises some ethical problems or any other kind of problems. Therefore we need ethics. (Participant 4)

The researcher then asked this participant why any researcher should feel the need to subject his research to an ERP and he had this to say;

*...as a means of minimizing harm, it (*ethics reviews*) is a legal obligation and part of the social responsibility of the researcher. (Participant 4)*

This means that it is the moral duty of the researcher not to cause harm or indeed minimise potential negative impact. Ethically reviewing research projects therefore is part of carrying out this duty. In addition to this, since the society through government agencies funds these university projects, it also becomes a social duty not to carry out

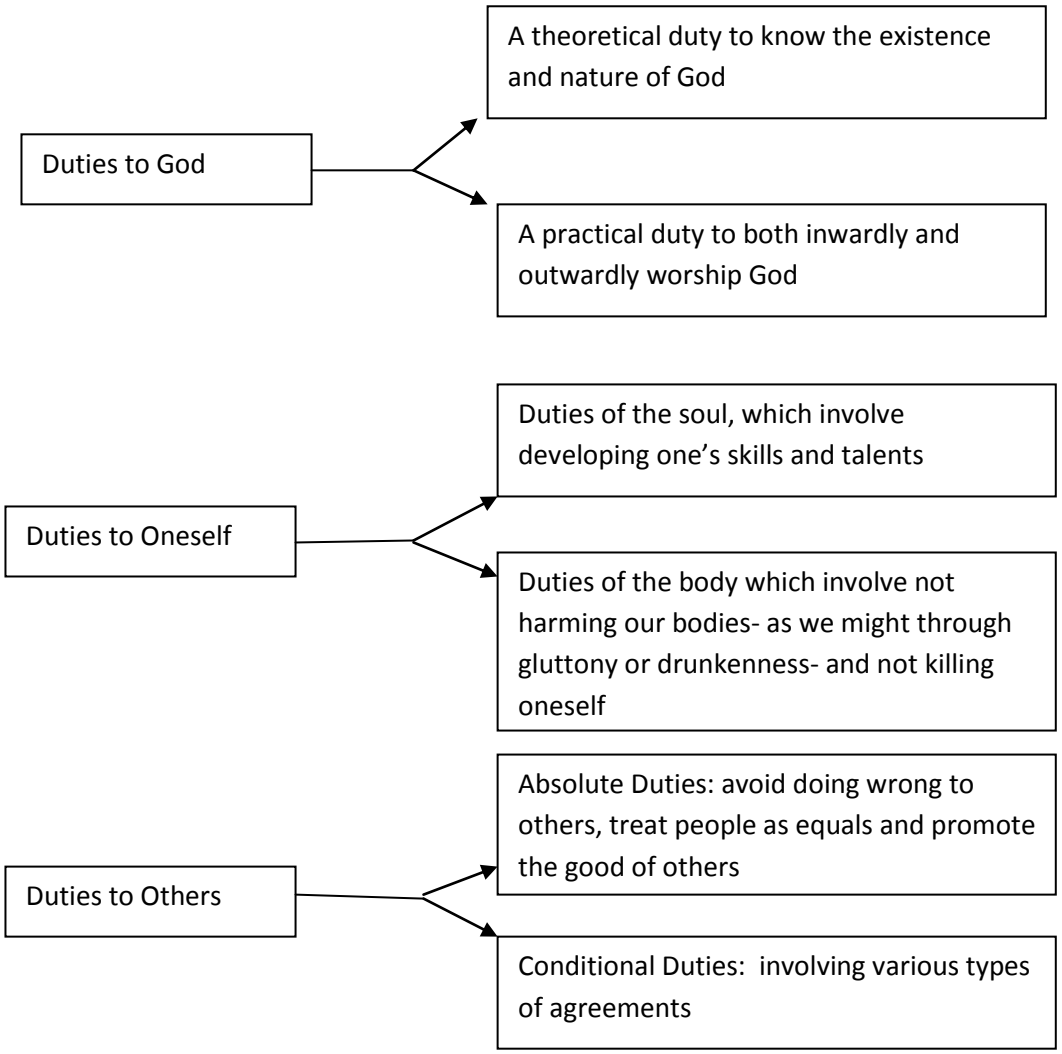
research that can harm the society at large. Finally, it was also noted that since it is legally wrong for researchers to cause harm, researchers ought to see it as a legal obligation. These show that there is an appreciation of the fact that ICT researchers do not only have a technical responsibility to produce good quality artefacts but also have an obligation to ethically consider all their research activities. The question that follows is; what is duty in this context?

7.2.1.1 What is Duty?

Literarily, duty is defined by MSN Encarta dictionary as ‘‘obligation: something that somebody is obliged to do for moral, legal, or religious reasons’’. However, in this context *duty* makes reference to normative theories of ethics discussed in the literature review [see section 2.2.2]. There are four main duty theories that describe different approaches to ethics which are all based on duty.

The advocate of the first theory is the German philosopher Samuel Pufendorf (Fieser, 2009). He identified various duties by classifying them under three categories of duties to God, duties to oneself and duties to others. The full classification is depicted on figure 7.1.

Figure 7.1 Pufendorf's classification of duty



The rights theory represents the second duty-based approach to ethics. Proponents of this theory such as John Locke, believe that there are rights naturally given to man, such as right to life, health, liberty etc-. According to these right theorists, these rights are natural, universal inalienable and also equal. Therefore, upholding these rights or acting not to go against these rights is a duty for all.

Another duty-based approach to ethics is expounded by Kant who posited that moral actions ought to be based on universal maxims that do not put consequences into consideration. These maxims dubbed 'categorical imperatives' according to Kant are applicable to everyone unlike what he called 'hypothetical imperatives' which are hinged on some personal desires. Examples are:

Categorical Imperative: *You ought to treat others as an end and never as a means to an end.*

Hypothetical imperative: *if you want to pass your exams, you ought to read.*

The above example of a categorical imperative is one of Kant's versions which imply that we ought to treat people with dignity and respect, not as mere tools to achieve an end. This theory therefore suggests that conforming to the categorical imperatives is a moral duty.

The British philosopher W.D Ross is the major proponent of the fourth duty-based theory. Ross's (1928-29) theory developed a set of multiple self-evident duties that one ought to follow which include fidelity, reparation, justice, beneficence, self-improvement, gratitude and non-malfeasance. These he called *prima facie* duties which means that at first glance, a mature person can intuitively recognise them through reason. For him, these duties are conditional and not absolute and may change depending on circumstances. This is because he believed that there may be a conflict of duties and in such a situation, one should follow the overriding duty. Ross was an intuitionist who argued that given the demands of a given situation, the mature person can intuitively know what is good and follow the appropriate duty. Thus, he never ranked these duties in order of importance.

7.2.1.2 Appreciation/Criticism

The above quotations from the participants, present arguments from the perspective of the ethical theory of duty [see section 2.2.2.2]. In the face of these duty-based approaches to ethics, a question one can then ask is: What perspective of the duty theory offers the best argument for us?

It was not within the limits of this research to explore which perspective of the duty theory the participants were referring to. However, the answers that were provided offer an insight. Data put forward in section 7.2.1 indicate that there are shades of the four theories from the participants. This means that;

- There is a belief that ICT researchers have duties to oneself and also to others.
- There is a recognition of the fact that it is the duty of the researcher not to go against one's natural, universal and inalienable rights.
- Ethically reviewing ICT projects is the duty of the researcher not because he is considering the consequences but because it is good in itself.
- ICT researchers should see ER as a *prima facie* duty.

7.2.2 Trust

Asked if ethically reviewing of ICT research projects is relevant in the UK universities, some participants said;

It's important for purposes of the public image of computing (and notably AI) for computing people to be sensitive to ethics and for the public to be aware that they are. (Participant 1)

Another said;

Today's undergraduates and post-graduates are going to become tomorrow's engineers and managers. It is necessary to teach them about trust and how to build it. I believe the consideration of the ethical issues involved in your research builds trust between researchers or developers and clients; and between the researcher and funding bodies (Participant 6).

These perspectives on the role of 'trust' in relation to ICT research were evident during the interviews conducted. Ethically reviewing ICT research is taken as a key factor in building trust between the developer and users; between the researcher and funding bodies. It is very important in the success or failure of ICT artefacts. One of the ways of building this trust is by establishing effective ethical procedures to review ICT projects. In doing so, the developer or researcher sends out a positive message to the user that he/she is doing everything morally right in producing the artefacts. A user's knowledge that the ICT researcher is allowed to freely produce any artefact he/she chooses without being subjected to any ethical review can breed mistrust. Given obvious cases in medical sciences, this can be a valid reason to worry.

These views point to a belief that teaching students the necessity of ethics review procedures can help make their future products successful. It is acknowledged that establishing the relationship between ERPs and product success/failure is not within the limits of this work. However, Rogerson & Gotterbarn (1998) believe that there is a relationship.

7.2.2.1 What is Trust?

Rousseau et al (1998) defined trust as ‘‘the willingness to be vulnerable under conditions of risk and interdependence’’. According to McKnight (2005), the basic nature of trust is found as one feels the tension between depending upon another and instituting controls to make sure that other performs. He expanded that irrespective of the situation; one trusts the other to the extent one chooses to depend on the other. This implies that the extent of one’s willingness to become vulnerable and non-controlling to the other determines the level of trust one has in the other.

For Rousseau et al (1998), this concept of trust reflects the secure willingness to depend on a trustee because of that trustee’s perceived characteristics. And there are different forms or types of trust. McKnight (2005) mentioned three types which include; first, trusting beliefs which imply the conviction that the other has attributes that can create trusted intentions. Second, trusting intentions which mean the willingness to depend on the other, strong enough to create trusting behaviours. Third, trusting behaviours, which are assured actions that demonstrate one’s dependency or reliance on the other.

Each of the above general definitions and types of trust can be applied to ICT. Trust in ICT therefore can be defined as the willingness to depend or rely on ICT owing to its perceived characteristics. *Trusting beliefs* in ICT would be the convictions that ICT

product has desirable attributes. For example, ones belief that a personal computer in the lab is safe and reliable to use elicits trust. *Trusting intentions* in ICT would be the willingness to depend or be vulnerable to the ICT and its developers. An example of this is the psychological mind-set of one about to use the personal computer in the lab. Finally, *trusting behaviours* in ICT would be one's action to demonstrate one's dependence or reliance on the ICT. When one uses a personal computer in the lab, he/she is demonstrating the willingness to be vulnerable to the pc and its developers.

7.2.2.2 Appreciation/Criticism

In ICT development and usage, the issue of trust has piqued interest among researchers in recent times (Vance et al, 2008). As Clarke (2008) pointed out, trust should be at the heart of the design of ICT products because the failure to enhance trust may result in suspicion and eventual rejection of new technology. Just like in one's relationship with people, trust can determine what is accepted and what is not.

From the above discussion, it is clear that research or *process* which is an ICT characteristic can affect trusting beliefs in ICT. And if this is affected the other two types of trust will also be affected which will ultimately affect the level of ICT acceptance. This sheds light on why some of the participants pointed out trust as the reason that ought to inform the establishment of ERP in the UK computing departments.

It is their belief that ERPs will improve both the process and the characteristic features of ICT which in turn enhance trusting beliefs, intentions and behaviours of users in ICT. The participants' perspective of *trust* as the reason for ERs, can find arguments in consequential ethical theories to support it [see sections 2.2.2.3 and 7.2.4.2]. Trust here becomes the consequence of ethically reviewing ICT research.

7.2.3 Risk Assessment

Risk assessment is another concept that emerged as one of the reasons why ERPs are relevant for ICT projects from the interviews. A participant said;

If you tell me that ethics reviews in computing should be part and parcel of a risk assessment procedure, I will agree with you. However, if there is an independent body out there who engages in reviews of computing projects, I would say they will only impede the progress of research or researchers will see it that way. (Participant 7)

According to this view, ethics reviews in computing departments should be an integral part of risk assessment procedures. There is a belief that as part of risk assessment, ERs will become more valuable and meaningful to both students and staff. Therefore, most of the current issues discussed in relation to ethics in ICT will be put in better perspective if this is done. In summary, it is believed that ethics reviews of ICT projects belong to discussions on risk assessment and are part of risk assessment; it is an important and relevant discussion.

7.2.3.1 What is Risk Assessment?

Risk assessment is defined as a careful examination of what could cause harm to people in the work place (HSE, 2006). There are diverse factors that could bring about harm in an organization. Risk assessment involves looking at all these factors to make sure that enough precautions have been taken or to understand if more needs to be done to protect the employees or others from harm.

The major reason behind this is the belief that both workers and other people have a right to be protected from harm caused by a failure to take reasonable control measures (HSE, 2006). Therefore, it is the responsibility of the organization to minimize or

prevent the risk to they might encounter. Failure to do this in so many instances is against the law and it ultimately affects business profits.

In risk assessment, the most important things to do include; to decide what hazards there might be and who might be put at risk, to find effective risk control mechanisms for these hazards and to implement them, and finally to review these mechanisms as often as possible so as to access their effectiveness and also to be up to date with the law.

7.2.3.2 Appreciation/Criticism

Every research procedure or investigation has an element of risk, no matter how insignificant. Conducting a piece of research means that results are unknown to the researcher as well as their potential risks. It is thus difficult to assess the risks involved in conducting and taking part in the research. This issue of uncertainty is a major element of risk assessment. It makes a strong case for the careful assessment of the research process and objective to identify potential and immediate hazards to the researcher, the participants and also potential users of the products or services.

For the participant who pointed out this issue, ICT research ethics reviews, are or should be, part of compliance to risk assessment regulations. While acknowledging the fact that there are evident relationships between the concept of ethics and risk-assessment, the researcher notes that risk-assessment is part of fulfilling ethical standards and not vice versa. Ethics is wider than risk-assessment. However, the idea of risk-assessment as part of ER can find basis on the ethical principles of beneficence and non-malfeasance; doing good and not harm [see section 2.6].

7.2.4 Compliance

This concept reoccurred more in the participants' views. Most of the participants mentioned this directly or indirectly. For them the fact that most funding bodies today require researchers to justify that projects are or would be ethically revealed states a case for the establishment of ethics review procedures. One participant had this to say;

...one of the requirements of the university now is to have ethical guidelines in all faculties to establish a balance. So we need to demonstrate that we adhere to ethical guidelines in teaching ... the university ensures that there are ethical considerations in research projects because some funding bodies require that. (Participant 3)

In agreement with this point another participant said;

It is an important issue we need to consider for people teaching in ICT because there is a necessity to follow the legal framework. There are legal guidelines on explaining to people on how we use their data and how we protect the data. Many of our research involve gathering information on people and evaluating things with that. So it is good to have a sort of framework for ensuring that these things are done. (Participant 5)

Another participant went further to refer to it as utilitarian. He suggests that; *many of us believe it benefits us more to do it than not to do it. Yes, I can say it is a utilitarian response. (Participant 10)*

The above quotations illustrate that for these participants, ethics review procedures are important because they help all involved to be compliant with legal or funding requirements. Failure to establish ethics review procedures might affect funding for

research projects. Thus, ethically reviewing research projects becomes an important requirement that ought to be fulfilled because doing it is better than not doing it.

Moreover, it was pointed out that establishing ethics review procedures for ICT projects can be a valid way of avoiding litigation. For one participant, compliance here provides an avenue to avoid legal problems. He said;

Nobody would like to be sued for negligence. It serves as a reminder of all the things we need to do to avoid it. (Participant 8)

Participant 3 also said that;

...with available legal frameworks on how research is done, people have started thinking about it in terms of avoiding litigation and fulfilment of requirements.

Avoiding litigations becomes a driving force for proactively establishing ERPs. On the issues regarding ICT research, both the researcher and the university would effectively avoid being sued or paying damages if they show the existence of procedures in place for ethically reviewing research projects.

7.2.4.1 What is Compliance?

Literarily speaking, compliance is associated with the word 'conformity' which means the state or act of conforming with or agreeing to do something (Encarta, 2011). This definition has offered the basis for varied definitions of compliance depending on the discipline in context. Given a lack of definition of this word in ICT research, we will go ahead to define it as the act of adhering or conforming to existing regulations or guidance by the ICT researcher. These regulations include legal, organizational or funding requirements.

7.2.4.2 Appreciation/Criticism

The above data point to two forms of consequentialism; rule consequentialism and act consequentialism [see section 2.2.2.3]. Rule-consequentialism holds that an action is right if it is in accordance with a certain code of rules (Portmore, 2009). This means that an act is morally permissible if and only if it is allowed by a set of rules, which if complied with, would produce the most good.

On the other hand, act consequentialism holds that the rightness of an action depends on if an action produces a better consequence than alternative actions available to the agent (Bunnin & Yu, 2004). An act is morally permissible if the compliance to a set of rules by the majority would produce the most good. Generally speaking then, both forms agree that the rightness of an action is determined by its consequences. Whereas rule-consequentialism does that indirectly, act consequentialism does it directly.

For those who believe that the establishment of ethics review procedures is only important because it is an adherence to regulations or guidance, they are expressing a form of rule-consequentialism. In this study, the participants who feel that complying with the regulations in the form of ERP helps in the avoidance of litigation are act consequentialists. Both views were popular with the participants and as such can be indication of the generally held opinion among computer scientists in the UK computing departments who believe in the relevance of ERPs

Among ethics scholars, these two forms of consequentialism generally attract a lot of criticisms. For the purposes of this research, only relevant ones would be put forward. First, rule consequentialism is always accused of collapsing into act-consequentialism (Hooker, 2008). This is because every rule has a reason behind it. For instance if the

rule says *you must read your books*, the full rule will then is, *you must read your books so as to pass your exams*. The alternative for not reading your books will then be to fail your exams. Thus, this becomes an equivalent of act-consequentialism.

Secondly, both forms attempt a definition of 'good' for the majority. This is what Moore (1903) referred to as the *naturalistic fallacy* because he believes that it is a mistake to attempt to define the concept of 'good' in terms of some natural property. This was evident in Jeremy Bentham's (a consequentialist of the Utilitarian strand) work, who found it difficult to calculate *'happiness'* (Burns, 2005). Without leaning towards Moore's idea, the contribution that can be pointed out here is that the idea of 'good' expounded by these forms of consequentialist thoughts restricts 'good' and 'rightness' of an act to some jurisdiction. This puts the idea of universality in morality into question. For instance, if the rule, 'Do not kill' is adhered to in Country 'x' and in Country 'y', there is a rule that states, 'you can kill'. The compliance to both of these laws might be permitted by consequentialists. Despite these criticisms, this view is still held as a valid and relevant rationale for defining moral actions.

7.2.5 Sustainability

Sustainability is also one of the issues raised by one participant. For this participant, ethically reviewing ICT projects today will play a part to ensure environmental sustainability. He said;

I tell you the issue of sustainability is rarely talked about in our circles, but there is a relationship between ICT and the much talked about environmental damages. A few researches are going on to determine the extent of the relationship but the result might be staggering in the future. We should therefore start thinking about how to minimize

the potential or current impact as the case may be, of what we do. Effective procedures for reviewing our research might be the first step. (Participant 6)

Even though this concept is not commonly discussed in ICT departments, this participant maintained that there is a relationship between ICT and the environment.

7.2.5.1 What is Sustainability?

There is no universal definition of sustainability. Different perspectives on what it is and how it can be achieved exist. However, the idea of sustainability is informed by the concept of sustainable development. According to the Bruntland Report for the World commission on Environment and Development (1987), sustainable development is defined as ‘‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’’.

After the first Earth Summit in Rio in 1992, this became a common concept giving rise to different variations and extensions on what constitutes sustainable development and sustainability. For a clear understanding of sustainability, six indicators were developed in response to the conclusions of the European council in Gothenburg and reported to the Spring European Council in March 2002. These include; greenhouse gas emissions, energy intensity of the economy, volume of transport to gross domestic product, modal split of transport, urban air quality and municipal waste collected, landfilled and incinerated.

7.2.5.2 Appreciation/Criticism

Sustainability is an issue that has received little or no attention in ICT discussions. This is because solid evidence of the relationship between ICT and environmental

sustainability is scant. However, there are some scholars such as Erdmann et al (2004) who believe there are signs that ICTs can have an important impact on environmental sustainability. They point to individual case studies on the impact of ICT on aspects of sustainability such as electricity consumption but acknowledge that there is no coherent research on the full range of impacts (Ibid).

The above fact is behind the decision of The Institute for Prospective Technological Studies (IPTS) of the European Commission's Joint Research Centre to commission a project entitled ''The Future impact of ICT on Environmental Sustainability'' (Ibid). The aim of this project was to explore and assess the ways that ICT can influence future environmental sustainability.

This means that even though there is a great deal of uncertainty on the relationship between ICT and sustainability, there are identified areas where the development of ICT could have a significant impact (Ibid). Therefore, sustainability should be a legitimate concern for ICT researchers. Identifying sustainability as a reason for ERs of ICT research finds some basis on the ethical principles of beneficence; justice and respect for persons [see section 2.6].

7.2.6 Impediment

The researcher is using this word to refer to views pointing to the fact that ERPs are obstacles or hindrances to the progress of which were raised by the participants. A couple of the participants raised it in different ways during the interview. For them, ERPs are not relevant at all; rather they are impediments to good research. For one of the participants, ethics in computing research does nothing but hinder the progress of relevant research developments. He said;

Many computer scientists like me feel that ethics most times is an obstacle to valid research. What we do, do not raise any ethical problems. We do not need these road blocks that are just there to fulfil administrative requirements (Participant 9)

When reminded of other participants (computer scientists) who have vouched for the relevance of ERs, he replied; *what they do might involve human beings or animals, but in this department (his department), nothing we do raise any concerns. I do not know of any ethical issues involved in what we do.*

Furthermore, the participant was asked if such research that involves human subjects or animals needs ERs he replied; *it is left for such people to decide. I don't know because am not aware of what they are doing but I still believe that ethics slows down the research process. There is too much bureaucracy, the forms are a nightmare.*

Another participant echoed the same sentiments when he said; *I believe this is an unnecessary procedure that adds to the already heavy workload of the researcher. There is too much paperwork and at the end, considerable research time is lost. (Participant 11)*

When asked; if the ERPs are made easier and faster without big paperwork, would it be acceptable? He said;

If there is any research that involves human subjects which are just a few and the process is less cumbersome and fast, then I can say go on with it.

For these participants, ERPs in one way or another obstructs the research process. Therefore, its establishment is unnecessary and irrelevant. However, there were some hesitancy when specific and different situations from what they are aware of were put to

them. These answers reveal that if the procedures are made less bureaucratic and cumbersome, these participants will understand their relevance.

7.2.6.1 What is Impediment?

In its literal sense, this word refers to a variety of things. The Merriam-Webster online dictionary defines it as something that 'impedes', 'bars' or 'hinders'. Therefore, anything that is an obstruction, obstacle or hindrance can be referred to as an impediment. In this context, it means that ER of ICT research projects is only an obstruction, obstacle or hindrance to the progress of ICT research. In biomedical and social sciences, there have also been representations of ethics review as a hurdle or impediment to research (While, 1995; Hedgecoe, 2008). This means that some researchers consider ER as an unnecessary hurdle in their scientific development.

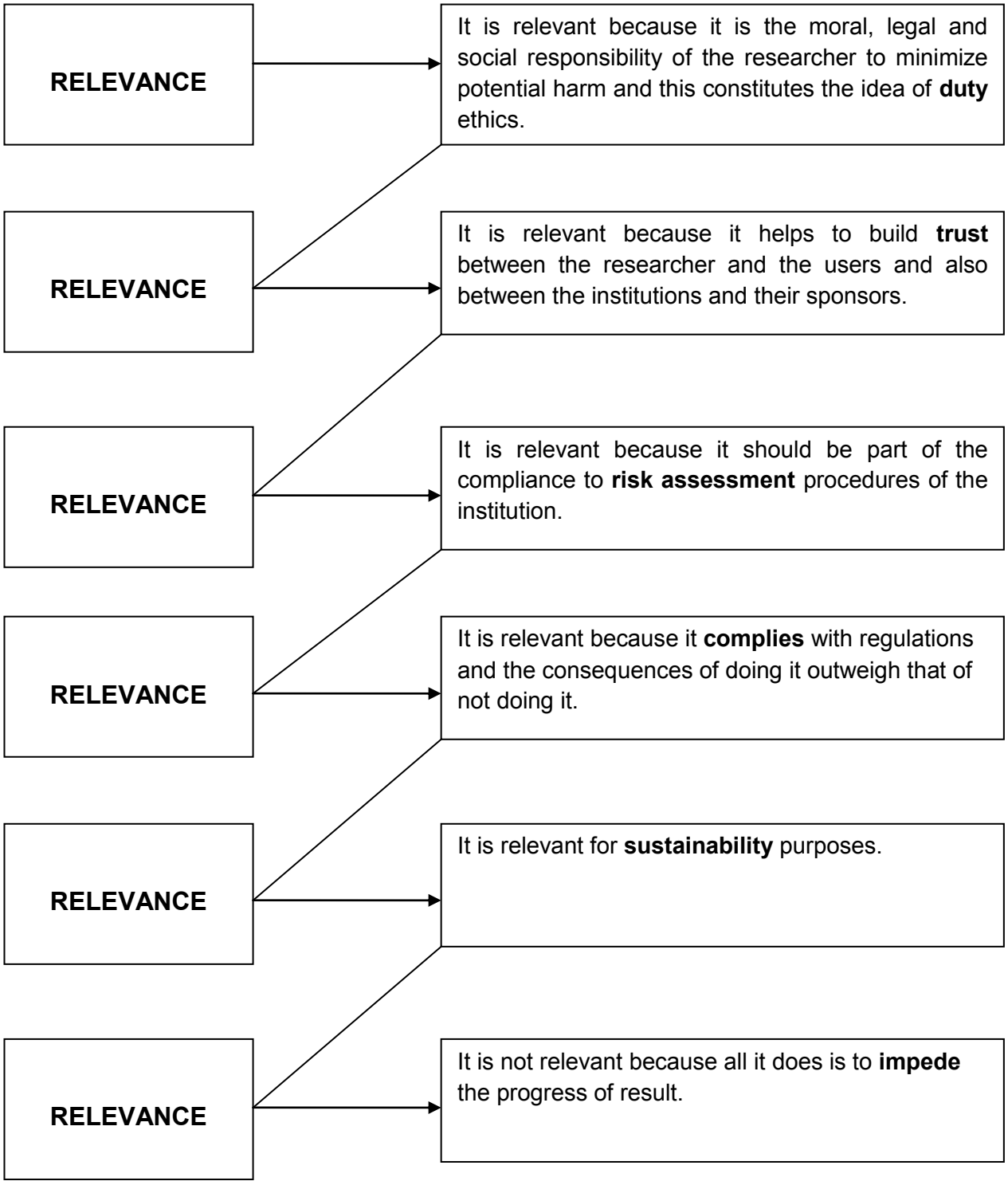
7.2.6.2 Appreciation/Criticism

This concept provides an important anti-thesis to the logic contained in the data on relevance and also in the entire research work. On the one hand there are participants, who believe that ERs are relevant in ICT research because of such reasons as: duty, compliance, sustainability and risk-assessment. In opposition to these views, here is a position that asserts that ERs obstruct and hinder valid research hence it is irrelevant [see section 7.2.6]. Rather than neglect the later view, this research accepted this view as a relevant part of the dialectic process that culminated in a synthesis in the conclusion [see sections 7.5 and 8.1]. Their rejection of ERs can be explained by the lack of clear understanding of what it means or what it entails which has not been helped by difficult procedures. That means that if they acquire more knowledge of ERs or if procedures are made easier and clearer, their position might be different.

7.2.7 Horizons of Understanding on Relevance

With a pre-judgement that ERPs ought to be an obligation for a researcher, the above views reveal various horizons of understandings new to the researcher. While this pre-judgement finds meaning in the concept of duty, the other views on trust, risk-assessment, compliance, sustainability and impediment provide different horizons of understanding on ERs. These horizons of understanding emerged through a hermeneutic circle depicted in figure 7.2. In this hermeneutic circle, the thesis (duty, risk assessment, compliance, sustainability) and the anti-thesis (impediment) can be synthesised in the following statements; Ethics reviews of ICT research projects are considered relevant but owing to lack of knowledge of what ethics is and cumbersome ethics review procedures for ICT researches in the UK universities, the progress of valid research can be impeded, hence the procedure can become more relevant if they are made clearer, easier and faster, such that ICT researchers receive adequate and sufficient knowledge and understanding of what it means.

Figure 7.2 Identified horizons of understanding on relevance of ERs of ICT research in UK universities



7.3 Understandings on Availability of Ethics Reviews of ICT Research Projects

During the interviews only two out of 12 participants were not aware of any form of reviews on ICT research projects in their departments. This corroborates the data the questionnaire provided [see section 6.2]. When asked the question; *does your institution have ERP or any means of reviewing research projects*? 12 participants bar two answered yes. A following question was then asked; *do you think it should be available?* Again, a short answer of *yes* was received from the participants who spoke of their belief in the relevance of ERs but the participants who didn't believe in its relevance gave a no answer.

Another question asked on availability was if the available ERPs were clear to all who are supposed to make use of it. In reply to this question, some of the participants made the following statements;

I think for somebody who has never used it before, he might have some vague idea that it exists....some of my colleagues have very vague notion of what it involves. (Participant 4)

It is clear to some people who are actually involved in it or have used the process before. For somebody like me who have never used it, I don't think it is completely clear. (Participant 6)

I believe most undergraduates and postgraduates do not understand the whole process including some supervisors. (Participant 2)

These passages from the interview transcripts indicate that even though there are existing ERPs in computing departments, most of the people who are supposed to use it (for example students and staff) do not understand it completely. Then those who have ERPs in their departments were asked for descriptions of their procedures. Important features that offer this description are as follows.

7.3.1 Suitability

Some of the participants confirmed the fact that the available ERPs in their departments were adopted from other disciplines. These disciplines include psychology, bio-medical sciences and in one case the social sciences. Asked if the currently available ERPs are peculiar to ICT research, one participant simple said;

I don't think so (Participant 3).

Others said;

Our university's ethical review is geared more towards the type of research that uses people or animals as experiments. It is not concerned particularly with broader questions of ICT like developing software that might have a direct effect on the society. It is very much geared towards psychological experiments. (Participant 4)

I don't know any procedure specific to ICT projects. We use guidelines from bio-medical sciences which are particular to researches that involve the use of human subject and animals. (Participant 8)

The researcher acknowledges that there are some similarities in the research interests of these disciplines such as the use of human subjects. However, the nature and features of

research conducted in these disciplines are different [see section 2.1.2]. Other participants have these to say;

... what we do in ICT is different from the research in bio-medicine and other discipline in the sense that different ethical issues arise in different disciplines. Nobody can say that privacy in computing is the same as privacy in medicine. (Participant 2)

... in our research, humans and animals are rarely used. I find it inappropriate to use guidelines from the health department whose research relies on them. (Participant 5)

Another participant echoed this point when he said;

What we do is hugely different from what they do in medicine. While research in medicine deals with research that largely involves human subjects or animal testing, research in ICT involves embedded systems, control systems... (Participant 7)

This means that the methods and nature of ICT research is different from research conducted in psychology and other disciplines. It is suggested that imitating ethics reviews in other disciplines is what ICT departments in the UK do. However developing

A framework that suits the particular needs of ICT research would be ideal (Participant 3)

Another participant raised a different issue when he said;

... I believe the difference between ICT and the health sciences is that our research process does not raise any ethical problems while theirs does raise a lot of ethical issues. However our products raise more problems than theirs (Participant 6)

Here, the participant is pointing to the issues of process and product as the difference between the two disciplines. For him, ERs in health sciences concentrate on the process because it raises ethical problems while the products do not. Conversely, in ICT where the process raises no ethical problems, ERs should concentrate on the product. Earlier discussions on the relationship between process and product [see section 2.7] put this point into perspective. Even though the process and product between the two disciplines are different, there is a fundamental connection between process and usage which is also important.

7.3.2 Tick Box

Another feature of ERPs available in the UK computing departments that also emerged was that it is a 'tick box form' procedure. A participant pointed this out thus;

...the only thing I know about ethics reviews is the 'tick box' form students need to fill at the beginning of their research. (Participant 1)

Another said;

If I remember correctly there is the initial stage where you basically tick boxes to say if your research involves human subjects or not. If it doesn't involve humans or animals then in a couple of minutes you begin to think that it doesn't need deeper ethical review (Participant 4)

This 'tick box' characteristic was also confirmed when the ERP links provided during the questionnaire were visited. The researcher discovered a general pattern of the tick box process which shows that the researcher is expected to complete an initial from to tick if a research raises ethical problems or not. If he/she ticks 'YES', he/she would be

expected to tick if it is minor or major ethical problems. Minor ethical issues are left for the researcher or supervisor to handle while major ethical issues will then go through the ERB. However, if the researcher ticks 'NO' to the first question, no further action will be required. This feature of the ERPs gives it a light touch feel as pointed by one participant. He said; *this renders it quite a sort of light touch process (Participant 6).* Such a characteristic does not necessarily impact negatively on the process. However, the fact that there is a lack of understanding and appreciation of what ethics (and ethics reviews) mean among ICT researchers [see section 7.2.6], a tick box process renders the review procedures weak. ICT researchers should have adequate understanding of ethics and the ethical issues that can be considered in their research so as to help the tick-box procedure to be meaningful.

7.3.3 Start of the Project Only

It was discovered that this available 'tick box' procedure only happens at the beginning of the project. Note that the second part of the quote from participant 1 above reads [see section 7.3.2]; *at the beginning of their research.* This was confirmed by another participant in these words;

Research methods can change as the research is going on but am not aware of any procedure to review projects as they are going on. (Participant 10)

Together with the available literature, these findings discovered nothing in the shape of ethics reviews that take place **during** and **after** the project is carried out. This means that if any ethical, legal or quality concerns arise during the project, there is little or no mechanism for review [see section 2.6].

7.3.4 Specific Projects

All the participants who revealed the availability of ERPs in their departments indicated that only specific projects are reviewed. This means that majority of the existing ERPs are designed to review specific projects.

I don't think most of our undergraduate projects go through the process. (Participant 2)

No, no. Not all the projects are reviewed. I am sure of this. (Participant 6)

Another participant had this to say;

...it is more a case of relying on individuals to realise that if they are conducting a project involving human subjects for example, which is quite rare but if they did, then they will need to seek ethical review of that. I don't think it is a problem if it is an unfunded research project, then I think the mechanisms that will take place will be different. (Participant 4)

The above finding supports the results of the questionnaire [see section 6.2]. However, the problem with this feature is that there is the challenge of deciding on the 'yardstick' for differentiating which research to be reviewed or not; undergraduate or post-graduate or staff projects; funded or unfunded projects; projects involving human subjects and projects that do not involve human subjects. Irrespective of the criteria decided on, the question remains: what can you do to make sure that research that needs reviewing is not passed on? This is because; *a few people ignoring the procedure when they shouldn't may threaten the credibility of the process (Participant 4).* Therefore, it is necessary to consider all levels of research in ICT to ensure that no problematic research slips under the radar.

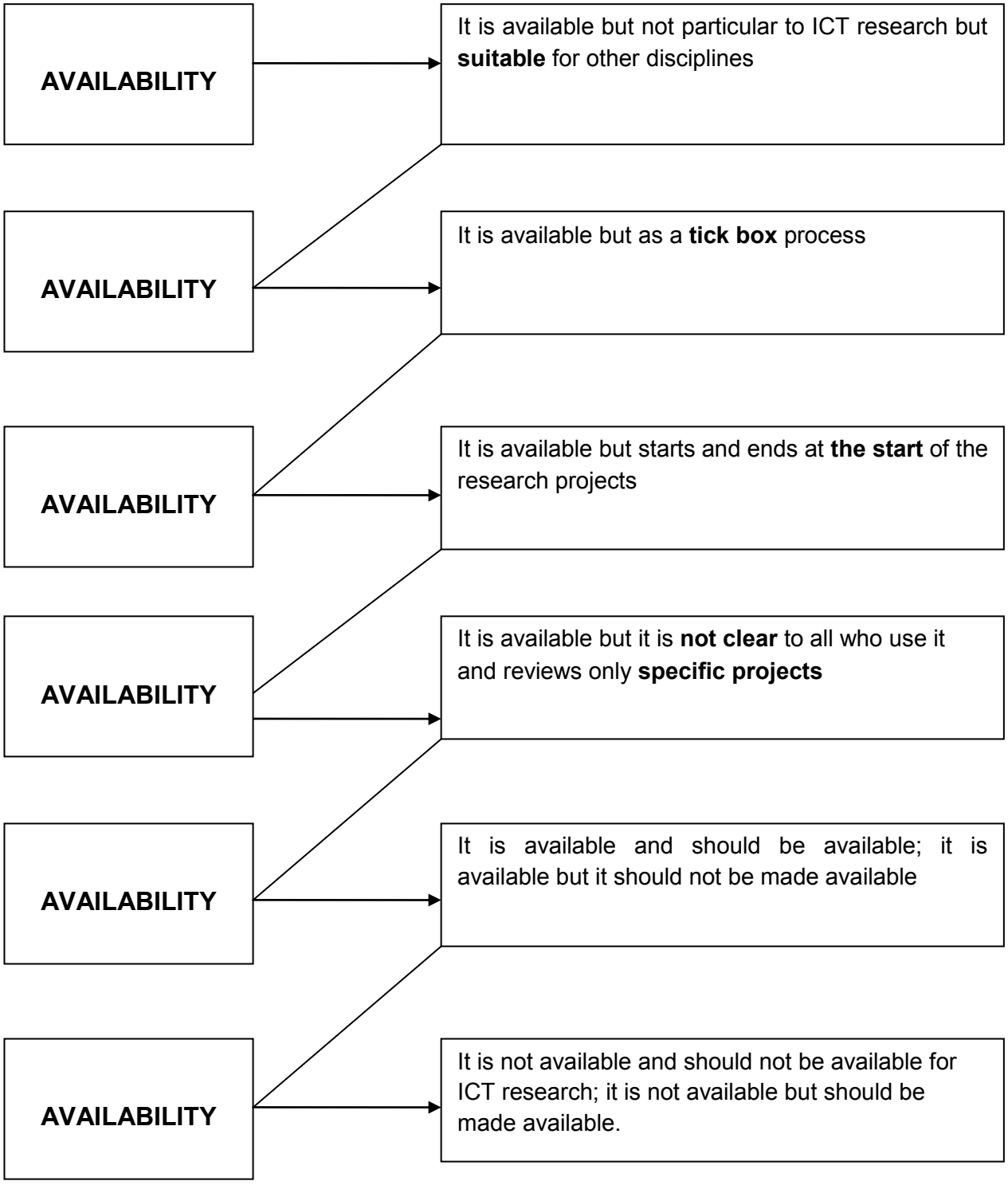
7.3.5 Horizons of Understanding on Availability

The above views also reveal different emerging horizons of understanding on availability. It should be noted that the researchers' pre-understanding was that ERPs should be available in all the UK computing departments. However, the emerging perspectives include;

- It is available and should be available
- It is available but should not be available
- It is not available but should be available
- It is not available and should not be available.

Others are that; it is a tick-box process, it is not suitable for ICT research, it reviews all or specific projects and it only happens at the beginning of the project. These different horizons indicate that; ERPs are not available in some of the UK computing departments, not everybody values it as a necessity and its features are not generally valued. Those who opposed the availability of ERB were those who didn't believe in its relevance [see section 7.3]. However, owing to the arguments presented in sections 2.1.2 and 2.6 of this thesis and the synthesis arrived at on the issue of relevance [see section 7.2], ICT research should have an ethics review procedure that is specific for its demands and this should be available in the UK computing departments before, during and after a research is conducted.

Figure 7.3 Identified horizons of understanding on the availability of ERs of ICT research in UK universities



7.4 Understandings on Effectiveness of Ethics Reviews of ICT Research Projects

It was noted that answers to questions on effectiveness depended largely on participants' disposition on relevance and availability. For those who believe that ERPs are irrelevant, whatever procedure available is taken to be ineffective. This is evidenced in these words;

...as a matter of fact, I believe it affects the progress of research. Therefore, I can't be convinced that it is effective in anyway. (Participant 9)

Another said;

For the reasons I have said earlier, these procedures are not effective. (Participant 12)

These show that their disposition on the relevance of ERPs implies that they believe in its ineffectiveness. Furthermore, some of those who affirm its relevance hold the view that it is ineffective for different reasons. One of such participants said;

What we do at the moment is not working. The students do not understand the form they fill and the staff do not get much guidance. It doesn't mean much to both staff and students. (Participant 2)

Another said;

There is a reliance on a researcher who lacks the necessary knowledge to be candid on the ethical concerns in his research. (Participant, 6)

For these participants, especially participant 6, the ineffectiveness of available ERPs stems from the fact that those who are expected to use the procedure lack adequate

knowledge of both the ethical issues that may arise and the procedure. Another participant believes that the procedure itself informs its ineffectiveness. He said; *there are no reviews during and after the research, important concerns are overlooked. The procedure itself needs improvement. (Participant 5)*

Furthermore, another participant blames the ineffectiveness of ERPs in computing departments on the lack of regulatory frameworks on the ethics reviews of ICT research projects unlike in the bio-medical sciences. He pointed out that; *lack of regulations on ethics reviews in computing renders the procedure very informal and in reality self-policing. (Participant 1)* For this participant, there is a need for regulations reflecting the relevance and method of ethically reviewing ICT research projects.

However, other participants who believe in the availability of ERPs agree that the available procedures are effective. According to one of the participants,

I wouldn't change anything about what we do at the moment. It is quite effective. (Participant 8)

Another participant agreed with this when he said; *in my opinion, it is effective. However, there should be more awareness. (Participant 4)* This participant acknowledges that more awareness needs to be created even though he believes that the current procedures are effective. Other participants also followed these lines. They asserted that the procedure is effective so far but needs some changes. They said;

Yes, it is effective but can become more effective if some changes are made. The forms need simplification. They can expedite the approval or rejection decisions. There can be an automation of submission checking to identify areas of closer scrutiny. (Participant 10)

Yes, it is quite effective and has raised the profile of ethical issues in our University. I think it may be the relative use of it and students' concern about it that may have to change. Getting permission sometimes takes awhile. It can be damaging in that sense. (Participant 3)

This means that the effectiveness of the current ERPs can be improved if the changes are made. Such changes include; the expediting of the approval or rejection decision and the adequate education of researchers in ICT.

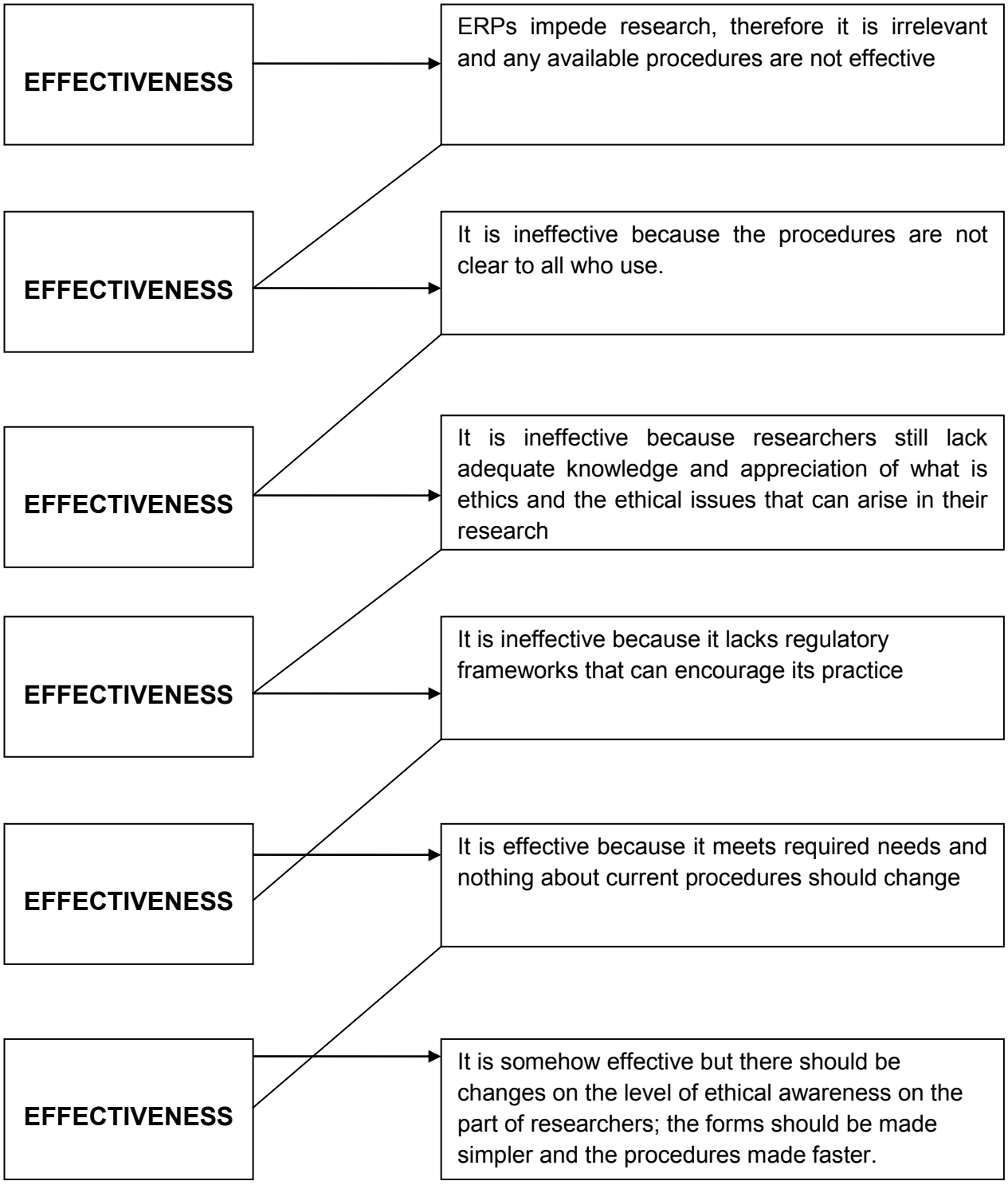
7.4.1 Horizons of Understanding on Effectiveness

On the issue of effectiveness, different horizons of understanding also emerged. These include;

- It is ineffective because it impedes research
- It is ineffective because of lack of knowledge on the part of those who are supposed to use it
- It is ineffective because there is no regulatory framework guiding it
- It is effective and needs no changes
- It is effective so far but needs more improvement.

These perspectives form an important part of the hermeneutic dialectic journey of this research and contributes to the richness of the general synthesis. That means currently, not all ERPs in the UK computing departments are taken to be very effective but can become more effective if some changes are made.

Figure 7.4 Identified horizons of understanding on the effectiveness of ERs of ICT research in UK universities



7.5 Emerging Hermeneutic Dialectic

At this stage of the analysis, with different stated pre-judgements [see section 4.3.2] the emerging perspectives of understanding of ERs in ICT departments (the whole) through the participants' views on its relevance, availability and effectiveness (the parts) are available to the researcher. This gives rise to a dialectic simplified in table 7.1 below.

Table 7.1 Summary of emerging dialectic of the hermeneutic process

Researcher's prejudgements	Participants' Views		
	Thesis	**Antithesis**	**Synthesis**
Relevance			
ER of ICT research is relevant because it is an obligation of the researcher not to cause harm and ERs help him to do that.	ER of ICT research is relevant because it is a researcher's duty, it breeds trust, it is part of risk-assessment, it is compliance to regulations, and it improves environmental sustainability.	It is not relevant because it impedes the progress of research through its difficult procedures and nothing we do raises ethical problems.	Ethics reviews of ICT research projects are considered relevant but owing to lack of knowledge of what ethics is and cumbersome ethics review procedures for ICT researches in UK universities, the progress of valid research can be impeded, therefore the procedure can become more relevant if the procedures are made clearer, easier and faster and ICT researchers receive adequate and sufficient knowledge and understanding of what it means.
Availability			
ER of ICT research is available in all UK computing departments	Yes, it is available It should be available	No, it is not available It should not be available	ERPs for ICT are not currently available in some UK universities however, owing to the synthesis arrived at on the issue of relevance, ICT research should have an ethics reviews procedure that is specific for its demands and this should be available in UK computing departments before, during and after a research is conducted.
Effectiveness			
ERs of ICT research is effective	It is effective It doesn't need any changes	No, It is not effective It needs some changes	Currently, ERPs in UK computing departments are not very effective but can become more effective if some changes are made.

This table demonstrates that the researcher has exposed his held views on ERs of ICT research to the different perspectives of the participants; the alternative understandings

are being appreciated through a deconstruction of his prejudices in the light of the discovered information. This leads to a construction of new meanings and understandings which are shown in this dialectic. However, owing to the different levels of comparison between ERs in ICT and the medical sciences evident during the interviews [see section 7.3] and in the literature review [see section 2.6], the researcher considered it necessary to conduct further interview to provide information for a complete understanding of the phenomenon under study here.

7.6 Lessons from bio-medical Sciences

Literature reviewed revealed that there are established ERPs in bio-medical sciences [see section 2.6]. These procedures have been improved and updated over the years. The researcher thus considered it necessary to discover if there are any lessons that can be learned to improve the effectiveness of the procedures in ICT research. Also, during the previous interviews, a lot of comparisons were made between research ethics in the health sciences and in ICT. Such comparisons included product and process [see section 7.2.1] and regulations [see section 7.3]. These issues were explored in an interview with the chair of research ethics review board in bio-medical sciences (participant 13). This interview provided information on the important difference and similarities between ERPs in bio-medicine and the current procedures in ICT. These differences are discussed below.

7.6.1 Product and Process

This participant was asked if he believes that only the process and not the product raises ethical problems in health sciences unlike in ICT as suggested by participant 6. He replied thus;

I think the principles of ethics review are similar in all research including yours and mine; security, confidentiality, do no harm, anonymity. I don't see any difference rather there is a connection between process and product. Research serendipity for instance - didn't look for it in good fortune, it just came about- penicillin. (Participant 13)

For this participant, the principles of ethics review are similar in both ICT and the health sciences. Also he believes that research serendipity necessitates a connection between process of research and the product. This is in contrast to the suggestions of participant 6 in section 7.3.1.

This researcher agrees with participant 13 on the fact that the principles of ethics review are objective (rather than subjective) and can apply to all research [see section 2.6]. There is also a further assertion that the distinctive features of each disciplines ensures that the nature of the ethical issues they each raise are different [see section 2.1.2]. Therefore, one can posit that even though the same ethical principles can be applied to every research, the ethical problems the various disciplines raise are different.

Furthermore, the researcher supports the position that there is a connection between the process and the product in any discipline including ICT [see section 2.7]. The idea of *serendipity* raised by participant 13 can be interpreted as *unintended uses/consequences* in ICT. The distinctive feature of malleability gives rise to so many consequences and usages of ICT products that were not intended by the researchers. Even though all of these cannot be predicted, it is the researcher's belief that an adequate ethical review can minimize potential unintended bad consequences and uses.

7.6.2 Presence of Adequate Regulations

Participant 13 was also asked if regulations have affected the effectiveness of ERPs in the health sciences. His reply was;

The regulations have ultimately meant that people are thinking about the questions they are asking in their research. Professional and ethical practices are considered more because of the regulations. Yes, I believe it has some effects.

He was then asked in what way and he said;

There is better experimental design. In fact, there is a belief that regulations have led to better quality of science and that is what we are about.

This finds support in earlier discussions in section 2.8 on the importance of regulations for ERPs. Participant 13 went further to ascertain that such regulations in the medical sciences have ensured better research and ultimately improved the quality of the discipline.

Reflecting on the above information, the researcher believes that adequate and effective regulatory framework has a role to play in the effectiveness of ERPs in ICT research in the UK. Unlike in the health sciences, ICT lacks adequate regulations and guidelines on the ERs of research projects [see section 2.8]. However, the level of ICT researchers' willingness to ethically review their research projects would be encouraged if there are clear guidelines on how this should it done.

7.6.3 Permeation or Integration Schemes

As a discipline with established ERPs, it was necessary to find out if there were schemes that help the medical sciences communicate, integrate and encourage the

appreciation of the meaning and relevance of ERs to users especially students. In reply to this question, participant 13 said;

I am talking generally now, in our various universities, it is part and parcel of an accredited bio-medical degree to have research ethics in the programme. This helps to communicate its importance to both staff and students.

Asked how students and staff react to this course he said;

Not everybody is happy with every course in the university. I guess because it is a requirement, it should be fulfilled.

This indicates that ethics or ethics reviews are important part of any accredited degree curriculum in bio-medicine. In some universities, computing departments/faculties have little or no ethics content in their curriculum. This was evident during the previous interviews where some participants had these to say;

I know we have a course on professional standards but I don't think we have ethics on its own (Participant 1)

Professional practices are thought in some of our modules but not as an independent module (Participant 6)

These findings demonstrate that most of the undergraduates in these universities do not receive enough education on ethics and ethics reviews and therefore lack adequate knowledge of ethics or ethics reviews which makes the implementation of ERPs difficult. This researcher therefore, concludes that establishing ethics reviews as important part of computing degree can improve the ethics knowledge base of both the students and the staff.

7.6.4 Proactive and Reactive Ethics

Both in the literature and during the interviews, it has been suggested that ERs in the health sciences are reactions to the various litigations its research has generated whereas in ICT, it is going to be a proactive action [see section 7.1.4]. Given the opportunity to comment on this, participant 13 asserted;

There is a bit of both. There are two categories of people in our field. There is a category of people who think that we do not want to do this because we do not want to be sued and there is another category that will see it as driving professionalism and patient care. I agree that both are realistic use of ethics.

This means that both views of ethics are in existence and relevant in bio-medical science. While some researchers comply with the procedures because they want to avoid litigation, others accept it as an important part of their responsibilities as researchers. Both views find some meaning in the earlier discussion on duty and compliance [see section 7.1]. The former (those who wants to avoid litigation) express in their action a consequentialist view of ethics, while the later believe in duty ethics. For the researcher therefore, both views already exist in ICT and can improve the acceptance of ERs in the UK computing departments.

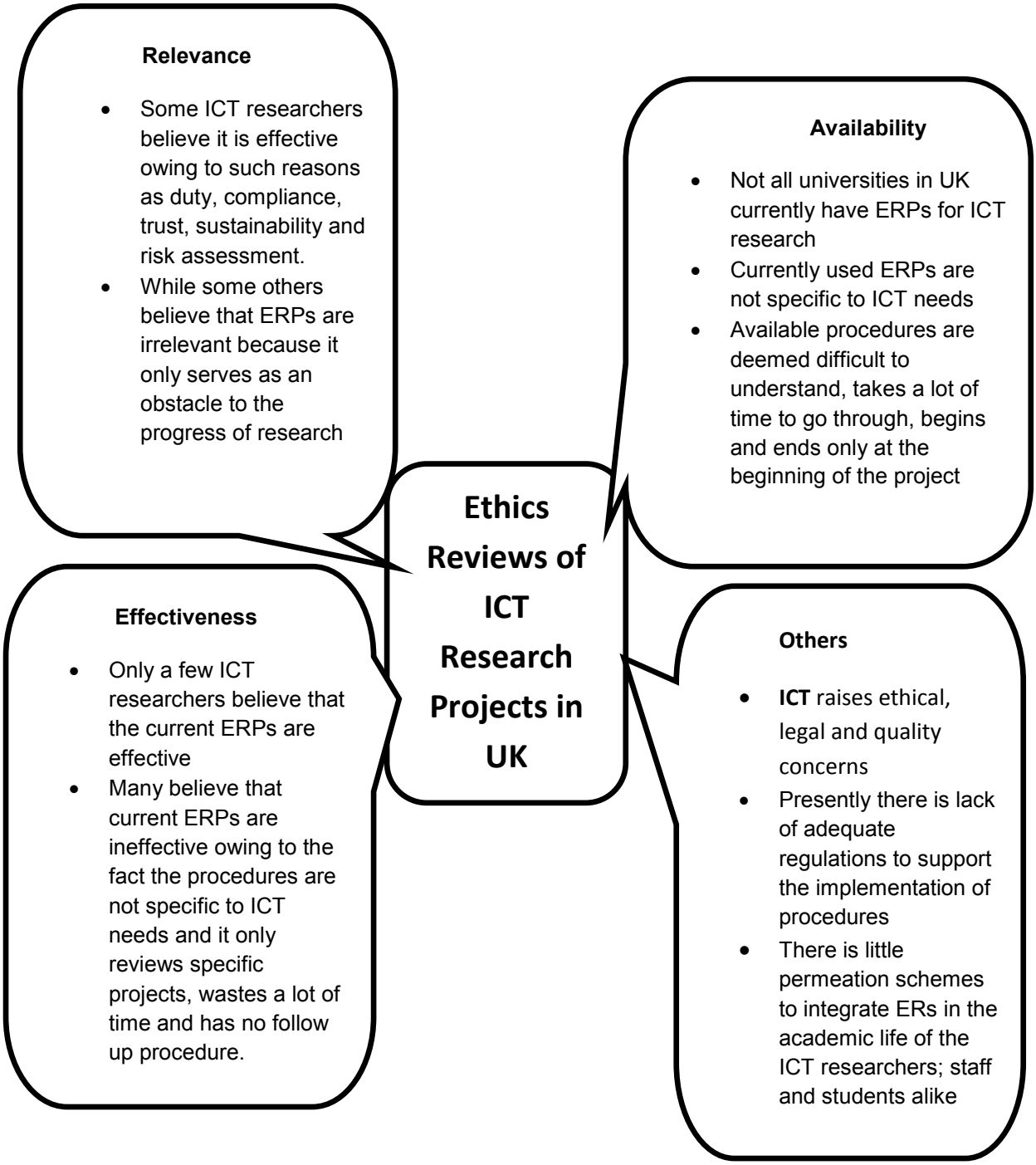
However, there are other meanings of reactive and proactive ethics which are *ethics after* and *ethics before* respectively. These understandings make reference to inception of research ethics in medical sciences which was necessitated by recorded tragedies in medicine [see section 2.5]. This means that research ethics in medicine is a result of these events while in ICT it is going to be pro-active action to prevent such events from happening (Weckert, 2002). The researcher believes that such understandings of pro-

active ethics in ICT is useful in understanding the relevance of ERs. Given the huge impact ICT advancements are having in the society and the distinctive features (malleability, ubiquity, pervasiveness, etc.) artefacts possess today, there are possibilities that untoward events similar to those in medicine might be recorded in the future. Therefore, a proactive action in the name of ERs can be relevant in developing ethics as a co-player in ICT research.

7.7 Conclusion

The analysis of the interview results using the dialectical hermeneutic method has been presented in this chapter. Using the excerpts from the participants, the emergence of the different 'parts' in the hermeneutic 'whole' was confirmed. Different minor horizons of understanding [see section 4.3.7] became evident and were presented in various diagrams (see figures 7.2, 7.3, 7.4 and table 7.1). Also, the summary of all the findings was presented with the help of figure 7.6 below. The next chapter will conclude the thesis by showing the major fusion (verstehen) of these horizons that would demonstrate this study's contributions.

Figure 7.5 Summaries of the Findings



CHAPTER EIGHT

CONCLUSIONS AND EVALUATIONS

Introduction

This final chapter presents critical discussions and the general fusions of evident horizons in this research. It contains the contributions of this research, recommendations, and also the relationship between the findings and the reviewed literature. It also evaluates the quality of the research process; revealing the possibilities of future research and also the limitations of the study.

8.1 Fusions of Horizons

Based on the research findings, [see Chapter 7] certain horizons or views of understanding on the ethics reviews of ICT research in the UK universities became evident. Through a hermeneutic dialectic, there were subsequent fusions of these horizons which resulted in a better understanding of the current state of the art in ERs in ICT departments/faculties across the UK. As pointed out in chapter four, there were partial fusions with regard to the specific themes: relevance, availability and effectiveness [see section 4.3.7]. These provided a richer description of these 'parts' and are different from *Verstehen* which is the general fusion of the horizons between the researcher and the subject matter with regard to multiple issues that constitute the ethics reviews of ICT as a whole. Here are both the partial fusions and the *Verstehen.*

Partial Fusions

Relevance

Figure 7.2 presented a representation of a hermeneutical dialectics of the different horizons of understanding of relevance of ethics reviews of ICT research which included that ERs is a researcher's duty and that it is part of risk-assessment which is important in research. These perspectives represent a thesis that ERs of ICT research is important which is similar to the researcher's pre-understanding that it is an obligation of the researcher not to cause harm, therefore, ERs which assists him/her in doing that is relevant in the research process. This view finds support in deontological duty (ethical) theories whose strengths are that it ensures that moral decisions are made out of something more than emotions:duty; it shows respect for human life and rights and that it is objective and can be applied to everyone regardless of culture, race and religion. However, it has weaknesses which include that it lacks solution to the situations of conflicts in duty and rights. For instance, suppose that unless a researcher (X) develops a system that violates the privacy of a group of people (Y), the lives of 5 million people may be in danger. It is then the duty of the researcher to do good by saving the lives of millions of people and also his/her duty not to violate the privacy of *Y*.

Furthermore, there were further horizons of understanding which include that: it helps to build trust between the researchers and ICT users and between the universities and funding bodies; it is compliance with sets of rules and regulations and also that it helps the sustainability of the environment. These are also *theses* that confirm that ERs of ICT research is relevant but find their basis in consequentialist ethical theories. This means that ethically reviewing ICT research is only a moral action because of its

consequences: trust, avoidance of litigation and building a sustainable environment. Consequentialist scholars generally think that this moral perspective is morally more attractive than deontology because moral actions are transient and the only thing that remains in the long run are the results or consequences (Bergström, 1996; Haines, 2006). There is also a belief that every human action is carried out in order to produce some sort of result for oneself or someone else. However, one of its weak points is that it lacks respect for human rights. Supposing the example of X and Y given above, the consequentialist will claim the burden of more utility to more people to violate the privacy of Y.

Finally, there was a third horizon that proved an anti-thesis to the above views; that ER of ICT research is irrelevant because it impedes the progress of research. Citing difficult, unclear, unsuitable and long existing procedures, these participants believe that rather than improve research, the process is currently an obstacle to ICT research. The findings on availability [see section 7.2] corroborate the facts on how unsuitable and unclear the procedures are in the UK universities. Faced with these different and contrasting perspectives, the researcher transcends these shared meanings (including his pre-judgement) to a more informed perspectives which are: *the relevance of ERs of ICT research can have both deontological and consequentialist bases because both have their strong points and also their weak points; the unsuitable nature of ERs procedures in ICT, lack of knowledge of these procedures and its cumbersomeness impede the progress of research. Therefore, the relevance of these procedures can be improved in the UK computing departments/faculties if they are made clearer, easier, suitable and faster. The hesitancy noticed with the participants who believe that ERs are not relevant indicates that with adequate education of what ethics is and the improvement of the*

present procedures, more people including these participants will appreciate ERPs in ICT research more.

Availability

The findings show that some of the participants confirmed the existence of ERPs or some sort of ethically reviewing ICT research in their departments. While a few of these think that it should not be available, others strongly believe that it ought to be available in all ICT departments. These divergent beliefs were informed by the participants' value of its relevance. The former are the participants who do not value the relevance of ERs in ICT research, while the latter do.

On the other hand, other participants were not aware of any form of ethics review procedure in their departments. Given the reason above, there were also divergent views on whether it should be available or not. It means that ERPs for ICT research are not currently available in all the UK universities. However, for those whose departments have ERPs, important features of the current procedures include that: it is not suitable for ICT research; it is only a tick box process; in some cases, it reviews only specific projects and it only happens at the beginning of the project. There has been continued adoption of procedures from the more established guidelines from other disciplines which does not the distinctive nature of ICT research. As for being a 'tick box process', there is nothing wrong with that. However, due to the evident lack of knowledge of ethics and ethical issues associated with ICT research, a tick box process renders the procedure as lightweight or ineffective. Even though some participants acknowledged that not all ICT research raises ethical problems, ethically reviewing specific projects can become problematic since there are no measurement tools available to decide which

projects need it and those that do not. Moreover, given the fact that research methods, structure and objectives can change midway through the research, conducting ERs only at the beginning of the research is not sufficient. Faced with these views or horizons of understanding, the researcher acquired a richer understanding of availability of ERPs for ICT research in the UK universities: *ERPs for ICT research are not currently available in all the UK universities and the available procedures do not meet the specific demands of ICT research.*

Effectiveness

With a pre-understanding that ERPs for ICT research should be effective the interview results presented the researcher with different views on the effectiveness of current procedures available in the UK universities. Some of the participants declared their belief in its ineffectiveness owing to such reasons as: it impedes research progress, there is lack of knowledge on the part of its supposed users; there is lack of regulatory framework guiding it. [See section 7.3.1] These reflect some basic reasons why some members of ICT departments in the UK downgrade the importance of ERs in their research projects. However, some participants declared their vote of confidence on the effectiveness of available procedures. Among these participants there is disagreement on the level of its effectiveness because while some believe that it does not need any changes; a few think that there is a need for improvement. For instance, even though participants 3 and 4 believe that what is available is effective, they also assert that there is need to make the process easier and faster and those who are supposed to use it more aware [see section 7.3]. In the light of these perspectives, *the researcher constructs an enriched understanding of effectiveness of ERPs for ICT research thus: available ERPs*

for ICT research in the UK universities are not very effective and therefore needs some changes or improvements to become more effective.

Verstehen (Complete Fusion)

In this research, the *Verstehen* which is the combination of all the partial fusions (both explicit and implicit) are as follows: ERPs for ICT research are not currently established in all the UK universities and the available procedures are only suitable for other disciplines such as medicine, psychology and the social sciences. ICT research, like any other discipline, can raise unique ethical problems [see section 2.6.1] and therefore requires ERPs that will meet its specific demands. The present procedures' unsuitability, lack of its knowledge, lack of regulatory frameworks and available slow and unclear procedures are believed to impede the progress of research which ultimately affects the level of relevance attached to it and its effectiveness. The findings showed that the currently available ERPs are not very effective and therefore needs some changes in education, implementation and practice. There is every indication that if the procedures are made clearer, easier, and suitable and faster, the level of its relevance will be higher among ICT researchers. So far, there are both deontological and consequentialist theories underpinning people's value of ERs for ICT research which have their strong points and their weaknesses. These theoretical bases might not be explicitly clear to the participants, but whoever holds similar views implicitly has a strong ethical background from which such views are held.

Another shared understanding is that there is a lack of schemes that would help both staff and students in the UK computing departments appreciate the value of ERs such as heavily involving ethics in the curriculum, and ethics seminars for staff and supervisors.

There are also the understanding that even though ICT research (process) is ethically less problematic than its products, the important relationship between the process and the product [see section 2.7] makes ER an imperative as a form of proactive ethics.

8.2 Recommendations

The research findings have shown that there are reasons to consider ERs of ICT research important in the development of better quality ICT products users would trust and also that would be sustainable. These reasons are both deontological and consequentialist. However, some shortcomings have led to the absence of ERPs in some of the UK universities and rendered the available procedures less effective. The value of ethics in ICT research is consequently downgraded. Thus, here are some recommendations for policy makers in both the regulatory bodies and also in the UK computing departments/faculty on how to address ethical issues arising in ICT research in the UK Universities effectively and proactively [see figure 8.1].

For Policy Makers in Regulatory Bodies (such as HEA)

Ensure the Creation and Provision of Regulations on ERs of ICT research

Policy makers in bodies such as the BCS and the HEA in the UK have important roles in ensuring that regulatory frameworks are created and provided to make ICT researchers to appreciate the consideration of ethics in their researches. Like in the medical sciences, there is a need to develop structures, through regulations, which will ensure the responsible development of ICT products. Both the reviewed literature [see section 2.8] and the interview findings [see section 7.5.2] revealed that ICT lacks such regulatory frameworks that are available in the medical discipline. In ICT, these regulations will raise awareness of the importance of ERs in ICT research, and also

provide tools and methods of identifying and addressing ethical issues and also ways of proactively considering legal solutions to foreseeable problems (Stahl, 2010). Such a framework will be a proactive measure and ultimately improve the quality of produced ICTs. To achieve this, a committee made up of ICT researchers with relevant experience in research and ethics should be set up to draw up a set of guidelines or regulations. These should take cognizance of the nature of ICT research and also the current and potential ethical issues it raises or can raise.

Establish ethics review frameworks specific to ICT

So far, it has been established that applying bio-medical and psychological ethics review procedures to ICT research has contributed to its effectiveness or in some cases its rejection in the UK computing departments. The different and distinctive features of what they produce make research in the different disciplines different. By implication, different research means that different ethical problems and concerns are faced by the researchers. Therefore, ICT research requires an ER framework specific to its research and product demands. This framework should cover particular issues identified in the research and development of both old and emerging ICTs such are personhood, agency and rights and the mechanisms of finding solutions to such issues. Having also established the important relationship between process and product in ICT [see section 2.7], such framework ought to address issues (where it can be addressed) that can ensure a better use of the products. Just as in the recommendation above, to set up a committee that would come up with an initial framework (which can be tried in some UK universities) is the first step towards achieving this.

For Policy Makers in the UK computing Departments/Faculties

Facilitate the education of both staff and students on ethics and ethics reviews

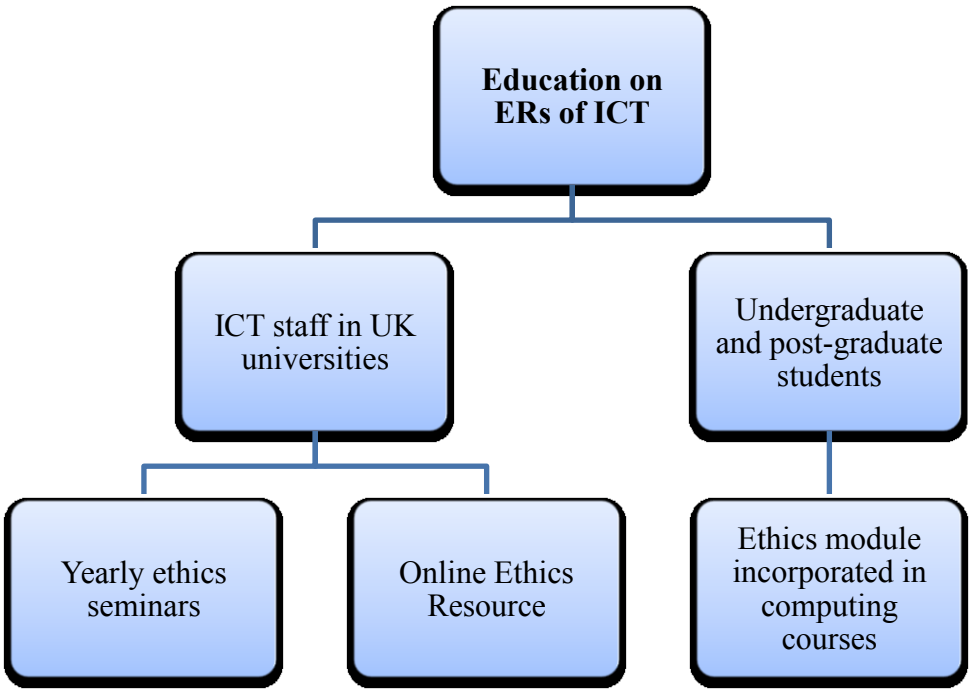
In computing departments, there is still a high level of lack of knowledge of ethics and ethics reviews in both staff and students [see section 7.3]. According to the findings, lack of a structured knowledge of ethics renders the procedures meaningless to some staff and students. This is because there is little ethics content in the curriculum. The ethics content available in some universities is reflected in a module on *the legal and professional issues in computing.* In recent years, some of the UK universities such as De Montfort University have started teaching modules dedicated to ethical issues in computing. This is aimed at educating students on the meaning of ethics and the ethical implications of identified issues in computing.

Therefore, there should be a structured module on ethics (which can be called computing ethics; Ethics in ICT; or ICT ethics depending on the choices universities) incorporated into the curriculum for undergraduates and post-graduates studying computing courses in all the UK universities. Among other things, this module would provide knowledge of ethical issues involved in the research, production and usage of ICT. Issues such as privacy, informed consent, security and potentially novel ethical issues would be taught through this module. [See figure 8.1] Case studies on how ethical issues can be identified and addressed in ICT research should form part of the learning materials process in this module.

It is also the role of policy makers in the UK computing departments to ensure that staff receive adequate knowledge of ethics and ethics reviews so that they can **appreciate** the meaning and relevance of adopted or available review procedures in their

departments/faculties. Ethics seminars should be organized for staff members annually. The fact that this would happen annually would ensure the knowledge gained is constantly updated. Also, an online ethics resource can be developed for staff in the UK computing departments. This resource can contain documents on both old and new ethical problems in ICT research, meaning and history of ethics reviews, guidelines on addressing ethical issues and other relevant documents [See figure 8.1]. It can also contain samples of how ethical issues are addressed in ICT research. Issues like personhood, rights, moral agency and other ethical questions related to ICT can be appreciated more if researchers have a deeper and wider understanding of these issues.

Figure 8.1



Ensure the review of all ICT research projects

Differentiating between researches that need reviewing and those that do not is ethically problematic [see section 7.2.3] since the full implication of each ICT research is hard to determine at its early stage. Ethically reviewing specific projects can therefore create a loop hole for certain research that needs reviewing to slip under the radar. It is the responsibility of policy makers in computing departments to avoid this by ensuring that all ICT research go through the procedure; be it at undergraduate, post-graduate or staff level; funded or unfunded projects. This can be achieved through regulations put in place to this regard. Even though some of these projects will raise little or no ethical problems, it is better to go through the procedure to determine this fact than overlook major ethical problems which the researcher was unaware of.

Make the procedure easier to understand and Faster

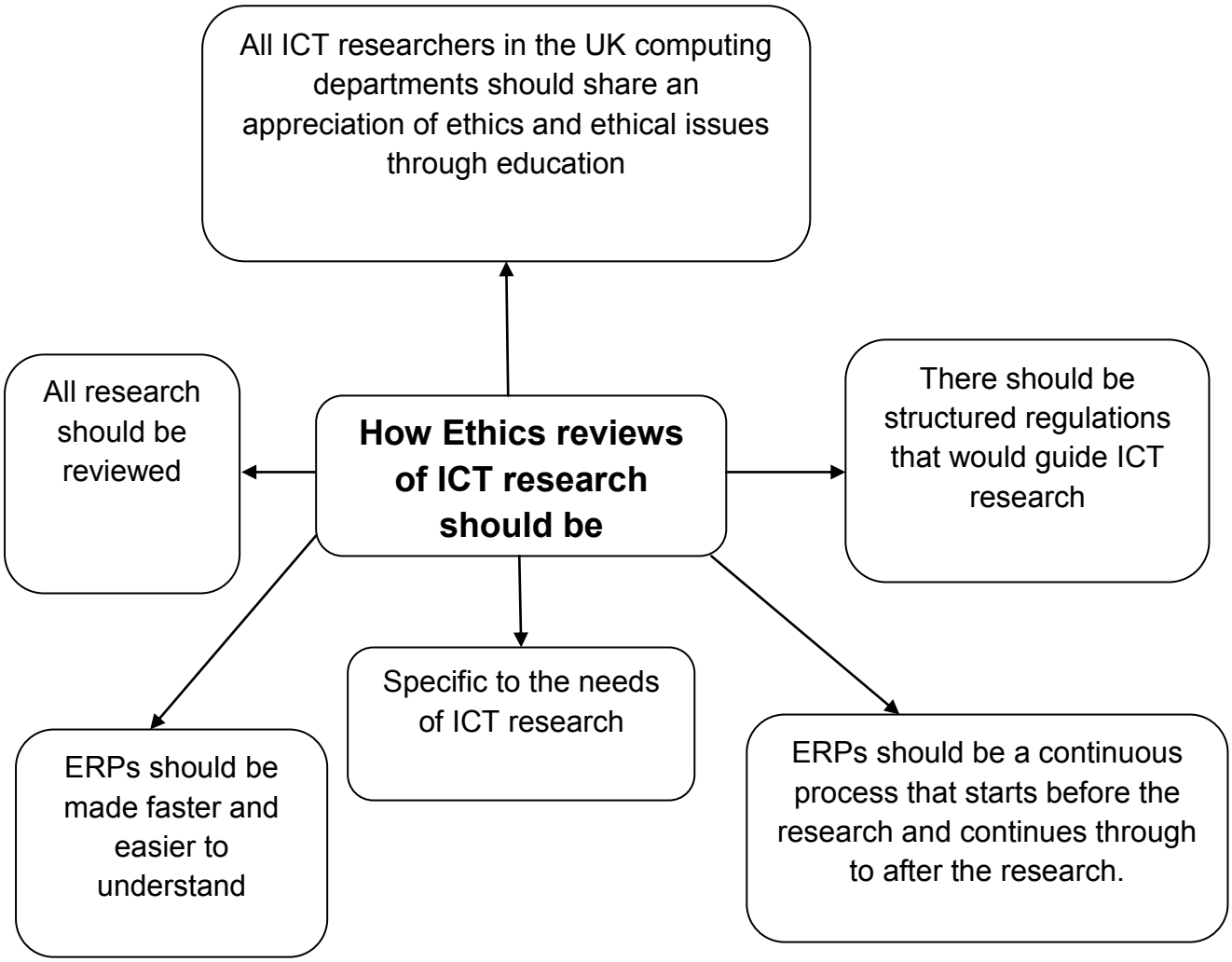
It is evident from the findings that some ICT researchers (undergraduates, postgraduates and staff) find the available procedures difficult to understand due to the amount of paper work involved. To make it easier, participant 3 suggested the adoption of an automated system whereby researchers submit their research objectives and methods in order to identify areas of concern [See section 7.3]. This is a valuable suggestion that needs consideration. Another means of reducing the amount of paper work and ambiguity involved in the procedure is the education of ICT researchers [see figure 8.1]. With a proper education and appreciation of the ethical issues involved in ICT research, ambiguity can be reduced and less and less paper work will be involved. Also the amount of time used up by Ethics review boards in the rejection and approval of projects make the procedure tedious and cumbersome. Structures for expediting

decisions should be adopted. For instance, if other institutional commitments of the members of the ERBs are reduced, the number of times they meet can increase which can make the process faster.

Make ER a continuous process

Currently, ethics review procedures of ICT research only happens before the research is conducted [see section 7.2.3]. There are no available mechanisms for reviews during and after the research is carried out. However, it has been established that ICT research like any other research can experience change of objectives and methodology midway through the research; and the results of the research can present certain ethical challenges. This means that ERs of ICT research ought to be an ongoing process that starts before the research and continues through to after the research has been conducted. Policy makers in the UK computing departments/faculties should ensure that mechanisms for ethically reviewing ICT research before, during and after the research are adopted without adding more delays to the procedure. One of these mechanisms can come through a change in the review process to reflect different stages of research (before the research, during the research and after the research). The different research culture of different universities can shape the way this is done.

Figure 8.2 the recommended structure of ERs of ICT research in UK computing departments



8.3 Research Contributions

This research has made academic contributions which are both theoretical and practical. Such contributions include;

1. By providing the current state of the art of ethics reviews of ICT research in the UK universities, this research is offering policy makers and researchers an opportunity to understand the strengths and weaknesses of the current procedures which can help them to make things better. It identifies some of the reasons why some researchers downgrade the value of ERs in ICT and also why the available procedures are less effective [see section 7.2].
2. This research provides recommendations for policy makers in both regulatory bodies and in the UK universities. It is hoped that following these recommendations will give the UK universities the opportunity to show leadership in creating and adopting ethics review procedures specific to ICT demands.
3. Even though the literature on computer ethics has grown in the past two decades, there is still a dearth of literature on the ethics reviews of ICT research which is an important part of computer ethics. This research contributes to the literature on understanding the mechanisms of ethically reviewing ICT research in the UK. This will contribute to the filling of a knowledge gap in the literature by providing discourses on the incorporation of ethics in the research and development of ICT.
4. This research provides ICT researchers with a theoretical discourse that will help them understand their ethical beliefs on ERs, and also the ethical and social issues associated with ICT research and development. Discussions on

ethical theories both in the literature review [see section 2.2.2] and the data analysis [see section 7.2] provide materials that can help researchers to identify arguments that can support their ethical beliefs.

5. Applying hermeneutics as a data analysis method is still a growing development in ICT. Therefore, using dialectical hermeneutics in this interdisciplinary research provides a methodological contribution that can shape future research. It served as an integrative theoretical framework which combined interpretive and positivist elements.

8.4 Relationship between available literature and research findings

In the literature review contained in Chapter Two of this thesis, it was established that little literature currently exists on the ethics reviews of ICT research. The reason behind this dearth in literature can be deduced from the findings of this research as the general lack of knowledge of ethics and ethics reviews existing among ICT researchers. The research findings indicated that both student and staff researchers in ICT lack adequate knowledge of ethics reviews which informs why little discussion and literature have been generated in this area of study. When asked to mention some ethical issues specific to ICT, none of the participants mentioned the ethical issues reviewed in section 2.6.1.3. This indicates either their lack of awareness of these issues in particular or ethics in general.

In section 2.7, Runciman (2004) advocated for the consideration of ethics at the beginning of research and development of ICT artefacts. This was corroborated by the research results through the opinions of the participants who believed in the relevance of ERs for ICT research. This means that in both the findings and the reviewed

literature, there are evidences to support the incorporation of ethics in ICT research and development. Furthermore, the findings made it clear that any adopted ERPs for ICT research should be specific to its demands owing to the fact that ICT with its distinctive features have unique ethical and social challenges. This can also be found in Weckert (2002) who believed that ICTs amplifies the import of old ethical problems and also Stahl (2011) who emphasized the distinctiveness of ethical issues associated with ICT research.

The participants' reasons for accepting the relevance of ERs of ICT research presented in section 7.1 are informed ethically by the theories reviewed in chapter two [see section 2.2]. Arguments for duty and consequentialist theories were evident in the participants' view of relevance which implies that whether they are aware of it or not, some ICT researchers have basic ethical theoretical appreciation of ERs.

Another important relationship is that none of the participants interviewed mentioned the issues reviewed in section 2.6.1.3. The issues of personhood and rights failed to get to stir the curiosity of the participants as issues that can be discussed in ICT research. This means either the current review procedures are not designed to consider such issues or ICT researchers are ignorant of the ethical importance of considering such issues. This can be addressed through following the above recommendation of educating researchers on such issues.

8.5 Evaluation

According to Ballinger (2006, p.235), quantitative researchers of the positivist leaning regard interpretive qualitative research as ‘‘‘merely’ subjective assertion supported by unscientific method.’’ One of the major challenges of qualitative researchers then is

how to assure the quality and trustworthiness of their research (Finlay, 2006). For the evaluation of the validity or the soundness of a qualitative research, Guba (1981) lists four criteria which are credibility, transferability, dependability and conformability. These are offered as alternatives to more traditional quantitative-oriented criteria of internal validity, external validity, reliability and objectivity. In this section, these qualitative criteria are used to evaluate the quality of this research.

Credibility

Credibility involves ensuring that research results are believable, which Lincoln and Guba (1985) argue is one of the most important factors in establishing the quality and trustworthiness of a research. To ensure credibility in this research these steps were taken; well established methods of data collection and analysis (questionnaire, interviews and hermeneutics) that served as operational measures were adopted. Well formulated lines of inquiry, which became relevant parts of this research, guided the questions that elicited answers from the participants. There was also an early development of a familiarity with the subject area through questionnaires before the interviews. This provided the researcher with a general knowledge of ERPs in the UK universities which was lacking in the literature and helped to understand the answers provided during the interviews. For example the questionnaire revealed that contrary to the pre-judgement of the researcher, some ICT researchers do not believe in the relevance of ERs which was corroborated by the results. Another step that ensured credibility of the research results here is the random sampling of the participants. Also the participants were made to understand that their participations were on a voluntary basis and reserved the right to withdraw at any time. This was solely to encourage them to offer information freely and without coercion. The active nature of the interviews

together with the understanding that the data would be anonymized further provided an opportunity for the participants to talk about the subject without fear of losing credibility. Visiting individual university websites was done to confirm if information such as the existence or non-existence of ERPs were correct. All these were done to ensure credibility in this research and evidences are contained in the thesis as appendices and include; sample of the questionnaire [appendix A], samples of transcribed interviews [appendix B] and examples of correspondences (emails) between the researcher and the participants [appendix E].

Transferability

Although each interpretive qualitative case is unique and specific to a particular environment and individuals, it is an example within a broader group which points to the possibility or prospect of transferability (Denscombe, 2007). Thus, Bassey (1981) suggests that an adequate representation of the context in a qualitative research can help researchers, whose situations are similar to that described in the study to relate the findings to their own positions. This thesis contains detailed information on the research questions, research background, motivations and objectives. There were also sufficient information and justification on the set of research philosophies and methodology adopted which led to adequate description of the research findings and the particular contributions this research has made. There were full descriptions of how concepts and most importantly for this research, how the dialectic emerged through a hermeneutic journey. All these can enable the reader or other researchers to compare instances of the phenomenon described here with those that emerge in their own situations.

Dependability

As Lincoln and Guba (1985) asserted, there is a close relationship between credibility and dependability. The demonstration of credibility in a research work helps to ensure its dependability which can be achieved through the use of different established methods. In this research, a detailed report on the research processes, that is, survey (questionnaires and interviews), dialectical hermeneutics and the justifications for using them provide readers and researchers with enough information on the coherence of the internal process of the research. In short, there is an in-depth description of the research design and its implementation which allows future researchers to assess its dependability.

Conformability

Miles and Huberman (1994) believe that a key criterion for establishing conformability in interpretive research is the extent to which the researcher admits his or her own predispositions. In this regard, identifying the researcher's pre-judgement was an important stage of hermeneutic method applied in this research. This helped to distinguish the experiences and ideas of the participants presented in a detailed discourse in sections, 7.2, 7.3 and 7.4 on the one hand and the researcher's characteristics and preferences on the other. This report also contains a transparent description of the research steps taken from the start of the research project through to the development of concepts and the reporting of the findings. A copy of a transcribed interview, a sample of the questionnaire and the correspondences this researcher had with the participants provide further evidence to establish the conformability of this research.

8.6 The Findings and the Research Questions

Every section of this thesis has contributed in providing answers to the research questions [see section 1.3]. However, it is necessary to point to specific sections of the findings that can help in identifying these answers. The evidences that demonstrate this are in the reviewed literature [see chapter two] and the findings on relevance [see section 7.2]; availability [see section 7.3] and effectiveness [see section 7.4]. The current state of the art on the ethics reviews of ICT research in the UK computing departments has been discovered; through the reviewed literature, the understandings of what ethics reviews are [see section 2.6] have been established; through the findings on availability, the features of the current ethics review procedures and their suitability to ICT research have emerged, while the relevance of ERs were discovered through the findings on relevance. Furthermore, the level of effectiveness of the current ERPs in the UK computing departments have also been revealed through the findings in section 7.4.

8.7 Future research

In the light of a better and richer understanding of the ERs of ICT research in the UK universities discovered in this research, the following future research work that could be undertaken:

1. Even though a quantitative tool was used in this research, the findings were qualitative; there can be further research that is based solely on quantitative research methods with a bigger sample size to produce comprehensive statistical results (with narrower confidence intervals). This will present a positivist perspective of this phenomenon.

2. Also, further qualitative research could be conducted with the aim of understanding the reasons behind the high level of unresponsiveness or expressed lack of interest among the target participants. The results of this research could provide further information on how to make the ERPs more effective for ICT research in the UK.

3. Today, most ICT research take place across various disciplines or departments. The lines between ICT research and other disciplines are getting blurred by the day. Owing to this increasing interdisciplinary and trans-disciplinary nature of research involving ICT, there is a need to develop a new structure for ethics reviews boards/committees for such research, so as to accommodate ICT researchers from different disciplines. This will ensure that all aspects of the research are understood and ethical issues properly identified and addressed. A study to explore the possibility of doing this and the practical ways of achieving it needs to be carried out.

4. Using the same procedures applied in this research, a comparative study of the same phenomenon can be conducted between two countries in Europe or non European countries. New concepts and horizons, which can be compared to the present findings, may emerge.

5. The relationship between ethically reviewing ICT research, and the application and usage of ICT artefacts partially explored in this research, is another interesting area for further research. The level of effect ERs have on the usage of ICT products needs further explication through either a quantitative or qualitative study.

8.8 Research Limitations

1. This research has made use of a quantitative questionnaire to broaden the researcher's knowledge of the phenomenon. Despite targeting 1076 participants, only 74 became the sampled population for this questionnaire. It can be argued that this sample size is small and consequently limits the import of the estimation of the true population. While the researcher acknowledges that 74 participants might be considered a small sample size but it is evident that;

a. A very large part of the population was targeted and a very large part of this population expressed their lack of interest or total derision on the phenomenon. Threatening emails were received by the researcher and the supervisors from some of the targeted participants. Samples of these emails are contained in appendix E. The attitudes of this part of the population denied the researcher an opportunity of a larger sample size.

b. Even though this research used a positivist tool, the intention was not to determine an objective reality but to understand better ICT researchers' (in the UK universities) interpretations of ERPs for ICT research. The estimation of the population proportion provided with the sample size was aimed at discovering ICT researchers' opinions rather than presenting highly significant statistics.

2. The high level of lack of interest expressed by the targeted participants can allow one to conclude that the participants in this research (in both the questionnaire and the interviews) are a group of researchers who share similar interests in the research subject. Generally, those who are opposed to the idea of ERs in ICT research were under-represented. It means that the research can be accused of a self-selection bias.

However, the purpose of this study was to obtain a better understanding of ERs of ICT research through the interpretations ICT researchers give it. There were efforts to reach all groups of ICT researchers in the UK universities and the findings of the interview indicate that those who are opposed to it were represented. The results from these participants (no matter how small) offer an insight into the views of this group of researchers and presented an important anti-thesis in this research's dialectic process.

8.9 Summary

Previous discussions on the integration of ethics in ICT were mainly on the application and usage of ICT artefacts. This research has drawn the attention back to the beginning - research and development. It investigated the current state of the art in ethics reviews of ICT research in the UK universities, seeking to identify if ERs of ICT research projects are available in computing departments/faculties; if they are available, how effective are they and how relevant do ICT researchers understand them to be?

An interpretive-qualitative approach was adopted in this research. This helped to understand the different meanings ICT researchers in the UK give the phenomenon. A quantitative tool was also used to collect some data. Through a dialectical hermeneutic process (which explicitly acknowledged the researcher's pre-understandings) the data was analysed and this analysis highlighted the component parts of the phenomenon. These offered richer knowledge of current state of the art of ERs of ICT research especially with regards to availability, relevance and effectiveness. The results provided sufficient answers to the research questions thereby justifying the adopted research methodology. Finally, the research has made some methodological, theoretical and practical contributions as well as offering proposals for future research, despite some acknowledged limitations.

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APPENDICES

Appendix A: Sample of the Questionnaire

Developing a Framework for the Ethical Reviews of Research in Information and Communications Technology: The State of the Art

Dear Participant,
The Centre of Computing and Social Responsibility (CCSR), De Montfort University, Leicester, supported by the Higher Education Academy (subject group Information and Computer Sciences) is conducting a research on the ethical reviews of research in Information and Communications Technology (ICT) in the UK. This survey is part of this research and we solicit your voluntary participation
Your contribution will help us to

- Understand the current state of the art in the ethical reviews of ICT research projects in the UK
- Identify the ethical problems research in ICT raise in the UK,
- Identify the challenges ethical reviews of ICT research face in the UK, and
- Ultimately build a practical and effective framework for ethics reviews of ICT research. **You should note these points before participating:**
- Your participation in this survey is entirely voluntary.
- You may decide not to answer some questions if you wish and you have the right to withdraw from the survey at any time by advising Mr. Damian Eke at seemeoki@yahoo.com
- Following our University rules, notes collected during this survey will be retained for 10 years after the completion of this research, after which these will be destroyed.

  Information gained from you will only be used for the purposes of this research and will not be recorded in excess of what is required.
- Only the researchers (Damian Eke, Prof. Bernd Stahl, and Dr. Christine Fidler) and potential thesis examiners will have access to the data collected during this survey.
- There are no known risks to you as a participant in this study.
- If you want additional information before participation, we will be willing to offer it you.

  We greatly appreciate your anticipated participation.

1 Which institution are you attached to?

2 What position do you occupy?

3 Do you think that research in ICT raises: Ethical problems?

- Yes
- No
- Do Not Know

4 Legal questions?

- Yes
- No
- Do Not Know

5 Quality concerns?

- Yes
- No
- Do Not Know

6 Does your institution/faculty/department's research governance structure involve ethics reviews of ICT projects?

- YES
- NO
- Do Not Know

7 Do these reviews involve an ethics review board?

- YES
- NO
- Do Not Know

8 If yes, are you are member of this board?

9 Does this procedure distinguish between the different levels of research; undergraduate, graduate and research carried out by staff?

Yes
No
Do no know

10 Do you think your institution's ethics review procedure has been effective so far?

Yes
No
Do Not Know

11 Which problems or challenges do this procedure and its implementation face in your institution?

12 If given the chance, how would you change this procedure?

13 Do you consider ethics reviews of ICT research relevant?

Yes
No
Do not know

14 Would you recommend that all computing departments in the UK establish ethics review procedures?

15 If you have answered YES to question 14 please state why you would make this recommendation?

16 We would like to do a more in-depth analysis of the answers we receive. Would you be willing to discuss these issues in more detail in an interview?

17 If YES, how would you prefer this interview to take place: face to face interview or telephone interview or email?

Face-to-Face

Telephone

Email

18 And when can you be available for this interview?

19 If you answered YES to question 16, can we please have your contact details?

20 Would you like to have access to the anonymised results of this survey?

21 Do you have any other comments? Please state them below

Appendix B: Samples of Transcribed Interview

Interview (a)

AVAILABILITY

Do you know if your department has an ethics review procedure or any means of ethically reviewing ICT research?

There is quite some good process in place and it normally doesn't affect our type of project. But certainly there are some types of projects we do which do need to get ethical review. People are meant to the existence of the process which they need to get review in some cases. And there is a representative in the school who sort of knows about the process and advises people on it. And also when a research project is set up, you have to specify that you have satisfied the procedure in order for them to set the account up for the research project.

Do you think then it is for specific projects and not all research projects?

I don't remember the rules of exactly how it works. I think it's meant to cover a full range of the projects that might occur. It is just that most of the project we tend to do have no ethical implications whatsoever. So it is more a case of relying on individuals to realise that if they are conducting a project involving human subjects for example, it's quite rare but if they did, then they will need to seek ethical review of that. I don't think it is a problem if it is a research project, even unfunded ones or if it has any sort of status, then I think the mechanisms that will take place will be different. For student projects- Masters project, there is no safeguard to ensure that they are reviewed. Say for example a Masters student wants to conduct a psychological experiment that is illegal, that student might not know that they should get some sort of ethical review and the supervisors might forget about it because they are not used to the concept of ethical review. So if there were possibilities of escaping it, it would be more on student projects than with funded projects, or phd projects or staff projects. However, a few people ignoring the procedure when they shouldn't may threaten the credibility of the process.

I get from your answer that your undergraduate projects are not necessarily reviewed?

Not as far as I know.

Do you think then that it should be available to such levels of research?

In principle yes I do. But I must emphasise that our university's ethical review is geared more towards the type of research that uses people or animals as experiments. It is not concerned particularly with broader questions of ICT like developing software that might have a direct effect on the society. It is very much geared like psychological experiments. That's why it doesn't really affect us.

From your experiences then do you think we should concentrate on those broad issues rather than imitate the psychological sciences?

I think there should be some sort of broad ethical procedure to fits computing departments. Yes.

Do you think the available ethics review procedures in your department are clear to all who use or who should use it?

I think so. I think for somebody who have never used it before, they might have some vague idea that it exists. They will then have to go and find out about it. But once they start to find out about it, it then becomes clear. Some of my colleagues have very vague notion of what it involves while staff in psychology department constantly have to deal with it. It happens that if I remember correctly, there is the initial stage where you basically tick boxes to say if your research involves human subjects or not. If it doesn't involve humans or animals then in a couple of minutes you begin to think that it doesn't need deeper ethical review. It is only those doing psychological researches that always need deeper ethical review.

Yes, during my interviews with previous participants, I have come across the problems of this tick-box process, you think there should be an improvement on this light touch process as you said to make it clearer to all?

We are occasionally reminded of about it. I can't say how often. It is done by the member of staff who is supposed to be the ethics representative. I think he probably remind people of it once a year. That's my guess. Whether we need more, I don't know. But I think that side of things is ok. It is only when it gets to setting up a PhD project or masters project where it involves a supervisor and the student- the supervisory team then rely on a member of that team remembering that there is an ethics process that might worth going through. But as far as I know, the tutor who runs our PhD projects, I know he doesn't regularly remind people about some type of project that might need ethical review. That might be worth doing.

Some people seem to think that the tick box procedure should be replaced by an improved procedure that will allow people to understand ethics better, what do you think about this?

I think that's a great idea. I think as a school we are concerned about ethics in IT. So yeah having a more explicit procedure for when people propose projects be it

undergraduates or research students, there is no reason why on some of the paper work it couldn't say, about the ethical implication; have you thought about it. I don't think we have anything like that.

Some ICT researchers have mentioned that ERPs are obstacles, do you think it is or do you think it is something that will improve research?

Ehm! Sometimes, some types of research just need it. It is inappropriate to call it an obstacle. It is a bit unfair. It is a necessary part of research. It could be implemented in so a lot more helpful way. But I could see that it will make people do more work that they usually do without ethical reviews. I don't view it as a whole as an obstacle. No.

Since your research interest is Artificial intelligence, do you think AI and other new areas of ICT exacerbating ethical issues?

There are a number of areas in computing science that require ethical review and AI is one of them and not the only one. Examples are developments in virtual world and second life. I think the growing overlap between those worlds and the real world, that area requires ethical review. AI is a strong one but not the only one. I proposed to the national AI body that there should be an independent body to ethically review issues in AI modelling the arguments on embryology. I did make a point that I don't think basic research should be ethically be scrutinized. People should be able to carry out basic research without because its only when you start developing applications that you probably needs it. For example developing robotics through AI that can be used by the military for example requires ethical reviews.

Do you think then ethics reviews of ICT is proactive ethics?

I do believe that ethics in ICT should be proactive. I made that point in my proposal a few months ago. I believe it is because (a)It is intrinsically the right thing to do and (b) a lot of the troubles we have had with the public suspicion of ICT for example with nanotechnology, a lot of scientists sound as though are trying to defend what they do. Whereas if the public know that the scientists were proactively thinking about the ethical implication of things, there will be less suspicion or regarding scientists as evil. Yeah. Trust.

In order to establish this trust, don't you think it's necessary to review all projects instead of specific projects?

I would have to think about that. Maybe it is impracticable to form this division. But I suppose am a little bit anxious not to get into policing what is genuinely basic research. Perhaps if there were to be ethical review of such projects, there would have to be an opportunity to say, this is basic research which is not developing an application but might be used for such and such application which might have so and so implications. So yeah that might be a good thing. If that research is not going to develop any

applications, they should be prevented from doing the research. Even if it is readily apparent that somebody else might take it and develop applications that would have some implications.

The problem then is who decides what a basic research is that doesn't need reviews and ones that need reviews?

Ultimately, we can't do anything but to have a democratically accountable national body that has some representation of academic personnel so that they wouldn't be left out of it. And has some genuine accountability. It seems to work ok in other areas such as medicine.

RELEVANCE

From an initial survey, some ICT researchers believe that ERs are not relevant in ICT research but I can get it in bits from your answers that you believe ethics reviews are relevant why do you think it is relevant in ICT?

*Just like any other research, research in our department raises some ethical problems or any other kind of problems. Therefore we need ethics. Ehm, I think all types of things humans create be it technology or medicine can have bad effects. And people need to be aware of these effects and need to think about it and there should be opportunities to put protective measures in and as a means of minimizing harm, it (*ethics reviews*) is a legal obligation and part of the social responsibility of the researcher. The lofty reason will be to have some way of inhibiting bad effects. I think scientists in general ought to think about this because there is a tendency that they can be so wrapped up or excited about what they do sometimes that they shove aside the effects of what they do. That is the lofty reason but the selfish reason will be that if we don't do anything about it, it will cause public mistrust to be pragmatic.*

Most scholars actually think that trust is an integral part of developing new technologies. They believe that if the society doesn't trust what we give them, it will affect what we do. Govt bodies give funding and public mistrust might ultimately affect funding.

Ohh yeah. Interesting to hear that! It doesn't seem obvious that they feel that way but good. Just that sometimes, some scientists feel that the public ought to trust what we give them. It's the public's fault, the public need to be trained to trust instead of them doing something to earn the trust.

LESSONS FROM THE MEDICAL SCIENCES

Can we learn anything from the established ethics review of the medical sciences?

Yes we can. The obvious reason being that ICT is more and more getting into quite elaborate interactions with the medical sciences such as things like affective computing. So many therapeutic websites for depression, diet control, weight loss and so on exist but as far as I know there is no ethical control of such things. Such things can have bad effects even though they are built to be beneficial. Some increasingly intrusive computer research is more and more directly affecting people.

Despite these obvious convergence or interactions between medicine and ICT, don't you think we need specific procedure for ICT projects?

I think is more about making people aware of the ethical implications they might not have thought of but not the procedure. Applying the review in ICT might be really hard because anybody can develop a website that affects millions of people unlike psychology experiments. So how to properly apply ethical monitoring or policing of projects might be difficult.

EFFECTIVENESS

Do you think the current ethics review procedures in your department are effective?

Yeah, I do think so. Aside from the fact that it covers a broad range of things that are not particular to ICT, it seems just fine. I will say that in my opinion, it is effective. However, there should be more awareness.

Do you believe then that it is working so far or do we need to change anything about the procedure?

I think the basic features are fine, I don't see anything wrong with it. Ehm, it's just they need to become less parochial and friendlier, and more flexible to fit specific projects. To make it more explicitly tailored for specific disciplines. College by college or faculties as the case may be. Some paper work should be specific to some disciplines. It is very irritating to go through paper works that only talks about aspects of research in a different discipline.

Finally, what ethical issues do you think are specific to ICT research?

There are some specific issues. Privacy is a good one. I think things like possible criminal use of the technology, use by the military and by the intelligence services and things like that. There are also affective computing issues, issues with pornography. Also the possible bad effects of the virtual world- people getting too involved in it.

Interview (b)

AVAILABILITY

Do you have ERPs for ICT research projects in your department?

Yes, yes we now have an ethics committee.

Are these ethics review procedures peculiar to ICT research?

I don't think so. Ehm! one of the requirements of the university now is to have ethical guidelines in all faculties to establish a balance. So we need to demonstrate that we adhere to ethical guidelines in teaching and in research especially in some modules like the research project module. We need to demonstrate that ethical guidelines are adhered to. The university ensures that there are ethical considerations in research projects because some funding bodies require that.

Do you have any curriculum in your institution on research ethics or ethics in computing?

Ehm! There are elements of such in various modules. In terms of actual dissertations, there are ethical guidelines to follow. For some undergraduate and most post graduates, they have to present a write up talking about how they have thought about the ethical issues involved in their research. There is also an ethics form that they complete and have to submit in their initial project report. Over the summer when the students start meeting their supervisor about their projects and the first week of academic year, they are required to write up the initial plan of the project and how they have decided to deal with the ethical issues. They submit this with the ethical review form. If it is standard software application development, they have a standard tick list. If there is anything not standard, they then submit and ethical request which would then go to the Ethics committee for approval. Yes, mostly it is a tick-box process.

Do you think your undergraduate students have adequate knowledge on ethical issues?

They usually discuss it with their supervisor earlier on in their research. Then after that they write up on ethical considerations. There is only a small amount of ethical content in what they do. Throughout their undergraduate modules, students must have been taught or met with some ethical issues or case studies in one or two of the courses.

Is this enough to understand ethics and prepare them for the major industries?

Ehm, a lot of the students can be quite naive. I think it is something where as project supervisors; we do need to make it quite explicit now in the project description and in the assessment that it is necessary to demonstrate the consideration of ethical issues and also in the draft report. So there is quite a lot of promptings from the supervisor to

get the students to begin to address ethical issues. A lot of times, it involves the use of human subjects, about the use of data, protection of data, animals as test subjects which are rare and are not of high priority. With regards to the ethics review procedures, they do not understand all the procedures but they understand what they have to do which is submitting an ethics review form. A lot of them do now understand why the procedure is in place. I believe there is a gap in ethical consideration for undergraduate and post-graduates. But with the programme I run, we are consistently trying to bridge the gap.

RELEVANCE

Do you believe that ethics review procedures are relevant today in ICT research?

Yes, it is an important aspect of any research involving data from individuals nowadays with the data protection laws. expand

By implication, do you mean that it is relevant because we need to obey the law or because it is good in itself?

Ehm, it helps you to think about what you actually want to do and how you can publish data. At the end, you are avoiding litigation by following good practice. I think it was explicit in the past. But with legal frameworks on how research is done, people have started thinking about it in terms of avoiding litigation and fulfilment of requirements.

From your experiences, do you know any ethical or legal issues that have come up during research in ICT?

Ehm, I think the key one is making it explicit to people that they are going be tested, how the research will be used and what their rights are. It wasn't explicit in the past.

You mean informed consent?

Yes, informed consent. Ehm! It is quite good because you are actually telling them what they need to know. It becomes very necessary when testing involves children. It helps one to get ethical approval so as to avoid legal problems if you don't get it.

What of issues like privacy and confidentiality?

I guess telling people of how the data would be used and not publishing with names of individual on it can take care of such problems. I guess it is doing these is following good practice.

EFFECTIVENESS

Do you think the ethics review procedures in place in your department are effective as they are?

Yes, it is quite effective and has raised the profile of ethical issues in our university. It seems to work well. Policing, confining, constraining most students doing their projects that they are to protect the data they get from participants. On that side, it is effective and it is working. I think it is maybe the relative use of it and students concern about it that may have to change. Getting permission sometimes takes awhile. I can be damaging in that sense. If it is a standard project, standard data, then you can do a tick box and submit that but there are some problems and you need to go to the ethics committee for approval, it takes more time and that could become a barrier. Sometimes, one can question, is this worth doing for the research? Yes it is effective for typical projects but a bit constraining for those that require approval.

There is an established ERP in medical research; do you think the growing procedures in ICT need to learn sometime from the medical sciences?

Considering what they do and the full range of it, it may be that their ethical reviews are too strong. They tend to do a lot of research on human subjects or animal testing. In some sense it might be useful to learn. However, research in ICT that is quite different. We need a framework that relates to what we do all the time. Some of our research methods do not involve any ethical issues like developing software but rarely do you find research in medicine that does not raise one or two ethical issues. What we do is hugely different from what they do in medicine.

Do you recommend ERs of ICT research projects for all UK computing departments?

Yes, given that the graduates we are producing are going to the industry, they should be used to ethical issues in ICT and the standard of how to follow professional practice and it should be established in UK so that the students are aware of the issues they should be aware of. However, dearth of understanding of these issues for students is a concern.

Do you support the development of a specific framework for ethically reviewing ICT research projects then?

Yes, a framework that suits the particular needs of ICT research would be ideal. Yeah.

Appendix C: Ethics approval form

DE MONTFORT UNIVERSITY

APPLICATION FORM FOR RESEARCH ACTIVITY REQUIRING HUMAN RESEARCH ETHICS CONSIDERATION OR APPROVAL

Staff/Student Name

Mr. Damian Eke

Programme (if relevant)

Information Society Doctoral Programme (ISDP)

Title of Research Project

Developing a Framework for the Ethical Reviews of Research in Information and Communications Technology: The State of the Art

Brief description of proposed activity and its objectives:

The main aims of this investigation is to

- To understand the current state of the art in Ethical reviews of Information and Communication Technology research projects in the UK
- To understand the relevance of ethics reviews to research in Information and communications Technology
- And to build a practical and effective model for ethics reviews of research in Information and communications Technology

Ethical issues identified:

Owing to the fact that a survey will be conducted (involving questionnaires and interviews), voluntary participation and anonymous use of data will be considered

How these will be addressed:

Enough information will be given to participants on how voluntary it is for them to participate and how the data collected will be used and retained. The consent form will also accompany the survey.

To which ethical codes of conduct have you referred? These are specific to each Faculty and if you have a query please ask your supervisor or Faculty REC for advice.

BCS Code of Conduct & Code of Good Practice

Checklist for applicant:

Has the research proposal identified any of the following research procedures?

1. Gathering information about human beings through: Interviewing, Surveying, Questionnaires, Observation of human behaviour
2. Using archived data in which individuals are identifiable
3. Researching into illegal activities, activities at the margins of the law or activities that have a risk of personal injury
4. Supporting innovation that might impact on human behaviour e.g. Behavioural Studies

Have you considered the following? (tick boxes beneath for "YES"):

☒ Providing participants with full details of the objectives of the research
☒ Providing information appropriate for those whose first language is not English
☒ Voluntary participation with informed consent
☒ Written description of involvement
☒Freedom to withdraw
☒Keeping appropriate records
☒Signed acknowledgement and understanding by participants
☒Consideration of relevant codes of conduct/guidelines

Are there other/additional factors that could/will give rise to ethical concerns? E.g. language difficulties

List of accompanying documentation to support the application:

(1) A copy of the research proposal
(2) The details of arrangements for participation of human subjects (including recruitment, consent and confidentiality procedures and documentation as appropriate)
(3) A copy of all the documentation provided to the volunteer to ensure the clarity of information provided
(4) Copies of appropriate other ethical committee permissions (internal or external) or supporting documentation
(5) If appropriate: a list of proprietary drugs or commercial drugs to be used in the proposed investigation including formulation, dosage and route of administration and known adverse side effects
(6) A statement of your competence to carry out this research as a student or a brief one page curriculum vitae for each applicant, including recent publications (staff only)
(7) Other documentation as advised necessary:

There are four possible outcomes from reviewing the activity against the procedures in place:

1. no ethical issues
2. minor ethical issues which have been addressed and concerns resolved
3. major ethical issues which have been addressed and concerns resolved
4. ethical issues that have not been resolved/addressed

Authorisation

- The reviewer advises the SAB/REC of those activities in the first three outcomes.
- Activities in the fourth outcome are submitted to the Faculty REC for resolution

Signature of researcher / student **Damian Eke** Date **04/11/08**

Signature of supervisor Date

Appropriate authorising signature Date 07.05.09

This form complies with the DMU policy statement on Human Research Ethics, a full copy of which can be found in the General Regulations and Procedures Affecting Students.

A separate form is required for each project.

ADVANCE APPROVAL OF RESEARCH ACTIVITY INVOLVING HUMAN RESEARCH ETHICS

1 Respondents' co-operation in a research project is entirely voluntary at all stages. They must not be misled when being asked for co-operation.

2 Respondents' anonymity must be strictly preserved. If the Respondent on request from the Researcher has given permission for data to be passed on in a form which allows that Respondent to be identified personally:

(a) the Respondent must first have been told to whom the information would be supplied and the purpose for which it will be used, and also
(b) the Researcher must ensure that the information will not be used for any non-research purpose and that the recipient of the information has agreed to conform to the requirements of the Code.

3 The Researcher must take all reasonable precautions to ensure that Respondents are in no way directly harmed or adversely affected as a result of their participation in a marketing research project.

4 The Researcher must take special care when interviewing children and young people. The Faculty REC will give advice on gaining consent for studies involving children or young people.

5 Respondents must be told (normally at the beginning of the interview) if observation techniques or recording equipment are used, except where these are used in a public place. If a respondent so wishes, the record or relevant section of it must be destroyed or deleted. Respondents' anonymity must not be infringed by the use of such methods.

6 Respondents must be enabled to check without difficulty the identity and bona fides of the Researcher.

Appendix D: Provided university ethics review procedure websites

http://www.essex.ac.uk/reo/research_community/research_governance/ethics_in_research/

http://www.st-andrews.ac.uk/utrec/

http://www.uws.ac.uk/research/downloads/research-study-guide-08-09.pdf

http://www.cl.cam.ac.uk/local/committees/it-strategy/ethics.html

http://www.gold.ac.uk/research/ethics/

http://www.bath.ac.uk/internal/ethics/committee/

http://www.bath.ac.uk/vc/policy/ethics.htm

http://www.aber.ac.uk/en/quality-assurance/research-practice/section-4/

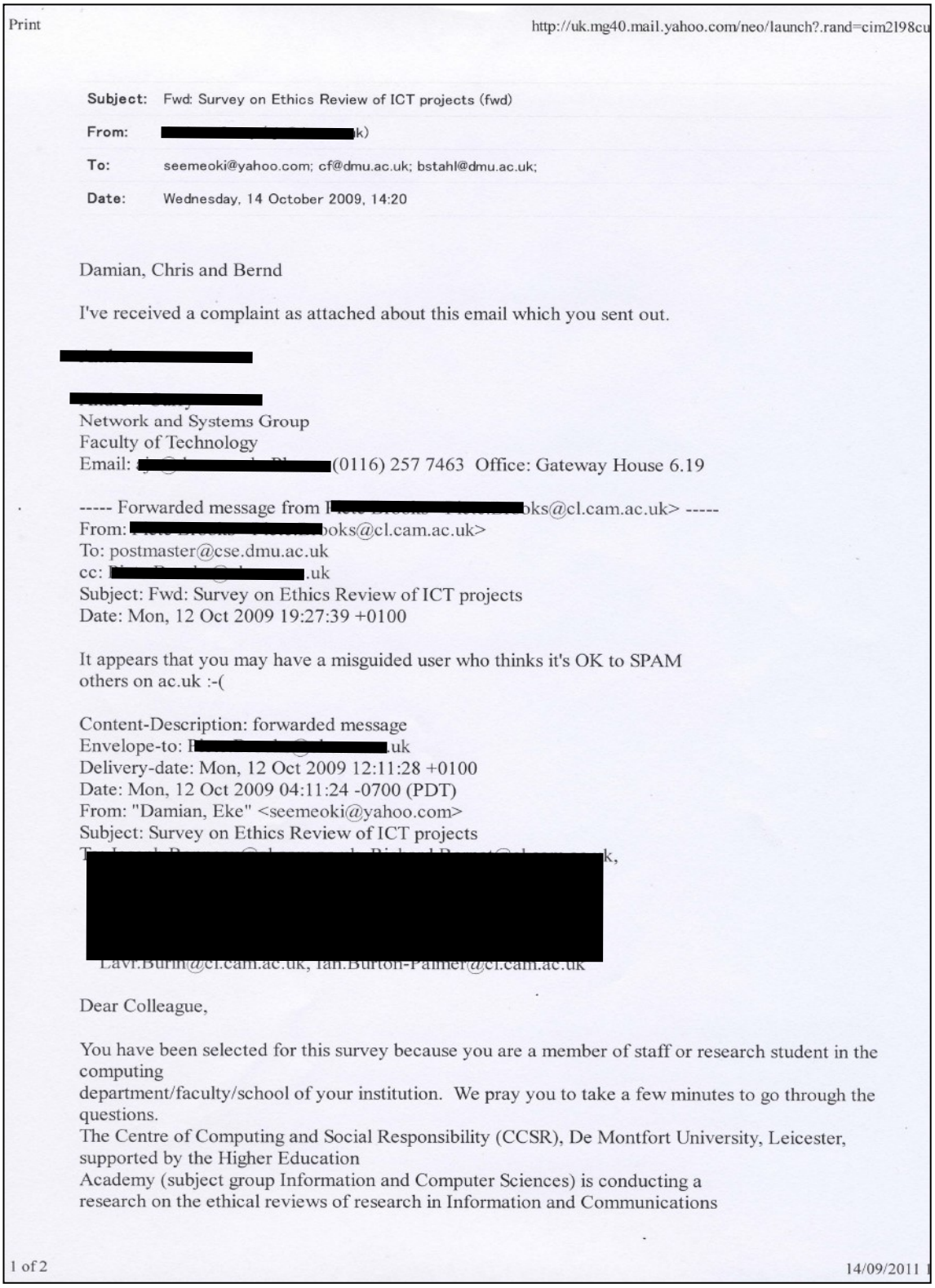
http://intranet.brunel.ac.uk/registry/minutes/researchethics/home.shtml

http://www.hw.ac.uk/policy/ethical_review_process.pdf

http://www.hw.ac.uk/hr/htm/policies/Code%20of%20Research%20Conduct%20(2)%206%20Mar%

http://www.glam.ac.uk/file_download/50

Appendix E: Sample of Email correspondences with participants



Print http://uk.mg40.mail.yahoo.com/neo/launch?.rand=cim2198cu

Subject: Fwd: Survey on Ethics Review of ICT projects (fwd)

From: [redacted]k)

To: seemeoki@yahoo.com; cf@dmu.ac.uk; bstahl@dmu.ac.uk;

Date: Wednesday, 14 October 2009, 14:20

Damian, Chris and Bernd

I've received a complaint as attached about this email which you sent out.

[redacted]

[redacted]
Network and Systems Group
Faculty of Technology
Email: [redacted](0116) 257 7463 Office: Gateway House 6.19

----- Forwarded message from [redacted]oks@cl.cam.ac.uk> -----
From: [redacted]oks@cl.cam.ac.uk>
To: postmaster@cse.dmu.ac.uk
cc: [redacted].uk
Subject: Fwd: Survey on Ethics Review of ICT projects
Date: Mon, 12 Oct 2009 19:27:39 +0100

It appears that you may have a misguided user who thinks it's OK to SPAM
others on ac.uk :-(

Content-Description: forwarded message
Envelope-to: [redacted].uk
Delivery-date: Mon, 12 Oct 2009 12:11:28 +0100
Date: Mon, 12 Oct 2009 04:11:24 -0700 (PDT)
From: "Damian, Eke" <seemeoki@yahoo.com>
Subject: Survey on Ethics Review of ICT projects
[redacted]k,

[redacted]

Dear Colleague,

You have been selected for this survey because you are a member of staff or research student in the computing
department/faculty/school of your institution. We pray you to take a few minutes to go through the questions.
The Centre of Computing and Social Responsibility (CCSR), De Montfort University, Leicester, supported by the Higher Education
Academy (subject group Information and Computer Sciences) is conducting a
research on the ethical reviews of research in Information and Communications

1 of 2 14/09/2011

Technology (ICT) in the UK. This survey is part of this research and we solicit your voluntary participation

Your contribution will help us to

* Understand the current state of the art in the ethical reviews of ICT research projects in the UK
* Identify the ethical problems research in ICT raise in the UK ,
* Identify the challenges ethical reviews of ICT research face in the UK , and
* Ultimately build a practical and effective framework for ethics reviews of ICT research.

You should note these points before participating:

You should note these points before participating:1. Your participation in this survey is entirely voluntary.You may decide not to answer some questions if you wish and you have the right to withdraw from the survey at any time by advising Mr. Damian Eke at seemeoki@yahoo.com

2. Following our University rules, notes collected during this survey will be retained for 10 years after the completion of this research, after which these will be destroyed.
3. Information gained from you will only be used for the purposes of this research and will not be recorded in excess of what is required.
4. Only the researchers (Damian Eke, Dr. Bernd, Stahl, and Dr. Christine Fidler) and potential thesis examiners will have access to the data collected during this survey.
5. There are no known risks to you as a participant in this study.
6. If you want additional information before participation, we will be willing to offer it you.

To participate in this survey click on the link below

http://surveys.tech.dmu.ac.uk/public/survey.php?name=Ethics_Review

I would be happy to send you a hard copy instead if you prefer that. Further information on our institute can be gotten from the link below.

www.ccsr.cse.dmu.ac.uk

We greatly appreciate your anticipated participation.

Sincerely yours,

Damian Eke, Bernd Stahl, Christine Fidler
Researcher
Centre for Computing and Social Responsibility
De Montfort University, Leicester

----- End forwarded message -----

From: "Damian Eke" <doeke@dmu.ac.uk>
Subject: interview
Date: Fri, January 28, 2011 3:35 pm
To: [redacted]

[redacted]

A few months ago, you completed a questionnaire on the Ethical Reviews of ICT projects in UK Universities and agreed to have an interview with us if need be. I am writing in that regard. I am Damian Eke from the Centre for Computing and Social Responsibility at De Montfort University. We would greatly appreciate it if you grant us the interview. It will be semi-structured interview which would help us to complete the research sponsored by the Higher Education Academy of UK. When do you think you would have time to grant us the interview and the venue. I would gladly come over to Loughborough for the interview. Actually, I would be at your University on Monday next. Do you think that day is convenient? If it is not, you can tell me a convenient time for you.
Damian

Researcher
Centre for Computing and Social Responsibility (CCSR)
De Montfort University,
Leicester,
UK

From: "[redacted]>
Subject: Re: interview
Date: Sat, February 5, 2011 12:16 pm
To: "Damian Eke" <doeke@dmu.ac.uk>

Damian,
suggest 2.00pm. Address as below.
Directions will be more helpful though. Come into Holywell Park from
Ashby Road (A512) possibly easiest to come from M1 Junction 23. Past
security cabin and park somewhere. You will notice a lake/pond on you
right as you come in. You want the far left of the really big building
which is entrance L, there is a glass entrance with a telephone in it.
If you ring me from there I will come down and let you in. Hopefully
life will be simple from then on.
I just hope its worth your while?

[redacted]

[redacted]e
Professor of Computational Intelligence
Leader Intelligent and Interactive Systems Research Group
FJ04
Computer Science
Holywell Park
Loughborough University
Loughborough LE11 3TU

On 4 Feb 2011, at 13:13, Damian Eke wrote:

>[redacted]
> Monday next week will be fine. I would like to know the address of
> your
> office and the particular time for the interview.
> Damian
>> Dear Damian,
>> would monday 7th PM do, that could be monday next depending where you
>> count from?
>>
>[redacted]
>>
>> On 28 Jan 2011, at 14:35, Damian Eke wrote:
>>
>>>
>>> [redacted]de
>>>
>>> A few months ago, you completed a questionnaire on the Ethical
>>> Reviews
>>> of
>>> ICT projects in UK Universities and agreed to have an interview
>>> with us
>>> if
>>> need be. I am writing in that regard. I am Damian Eke from the
>>> Centre
>>> for
>>> Computing and Social Responsibility at De Montfort University. We
>>> would
>>> greatly appreciate it if you grant us the interview. It will be
>>> semi-structured interview which would help us to complete the
>>> research
>>> sponsored by the Higher Education Academy of UK. When do you think

From: [redacted]s.bham.ac.uk>
Subject: Re: interview
Date: Wed, December 1, 2010 2:22 pm
To: doeke@dmu.ac.uk
Cc: [redacted]c.uk

Hi Damian, how about 2pm next Tuesday (7th)?

We could do it in my office, which is room 136 in the Computer Science building, near the railway station called "University" (on the line from Birmingham New Street to Longbridge or Redditch).

Best wishes
[redacted]

> Envelope-to: [redacted]
> Delivery-date: Wed, 01 Dec 2010 12:21:57 +0000
> X-Virus-Scanned: by Copperfasten Mail Firewall at dmu.ac.uk
> Date: Wed, 1 Dec 2010 12:23:02 -0000
>
> [redacted]
>
> A few months ago, you completed a questionnaire on the Ethical Reviews of
> ICT projects in UK Universities and agreed to have an interview with us if
> need be. I am writing in that regard. I am Damian Eke from the Centre for
> Computing and Social Responsibility at De Montfort University. We would
> greatly appreciate it if you grant us the interview. It will be
> semi-structured interview which would help us to complete the research
> sponsored by the Higher Education Academy of UK. When do you think you
> would have time to grant us the interview and the venue. I would gladly
> come over to Birmingham for the interview.
>
> Kind regards
> Damian Eke
>
>
> Researcher
> Centre for Computing and Social Responsibility (CCSR)
> De Montfort University,
> Leicester,
> UK
>
>

Appendix F: Published paper

Paper 1:
*Presented at the HEA **10th Annual Conference** of the Subject Centre for Information and Computer Sciences, **25th – 27th August 2009***
University of Kent at Canterbury

ETHICAL REVIEWS OF INFORMATION AND COMMUNICATIONS TECHNOLOGY RESEARCH PROJECTS ACROSS UK COMPUTING DEPARTMENTS: THE STATE OF THE ART

Bernd Carsten Stahl
CCSR
De Montfort University,
Leicester LE1 9BH
bstahl@dmu.ac.uk

Damian Eke
CCSR
De Montfort University,
Leicester LE1 9BH
doeke@dmu.ac.uk

ABSTRACT
This paper identifies both a conceptual and policy vacuum with regards to ethics reviews before, during and after research in Information and communications Technology (ICT). It describes the findings of an HEA development project that undertook to determine the state of the art of ethics reviews in UK higher education institutions. The paper presents a survey that indicates the current ethics review procedures that currently exist across UK computing departments. The findings underline the relevance of ethics reviews when conducting ICT research.

Keywords
ICT, research, ethics reviews, procedures, principles

1. INTRODUCTION

Research in Information and communications Technology (ICT) is broad and varied owing to the increasing convergence of technologies. It involves human beings and gives rise to varying levels of ethical problems. ICT research therefore requires an adequate regulatory model. Presently, there seems to be both a conceptual and policy vacuum before, during and after research in ICT. There is a need for decisions to be taken, ethical problems solved, legislation needs to be adopted and ethical framework for research review formulated and implemented. (Floridi, 2006) This is necessary because ethical frameworks for research on human subjects such as in biotechnology may not be appropriate. A framework specific to ICT research and its application is important. There are political and ethical pressures to be proactive in the consideration of ethics in ICT research projects rather than be reactive later on. These concerns are of importance to higher education institutions because an exposure to research is

considered one of the hallmarks of higher education and future researchers need to understand the relevance of ethics reviews during their taught studies.
Developing a standard ethics review procedure based on shared good practices is desirable. It will contribute to a more proactive research community where students, staff and institutions working on ICT will conduct research that meets key ethical principles. It will encourage good and ethical research and ultimately ensure the sustainability of ICT research. The aim of this research is to identify the current state of the art in ethical reviews of ICT projects in UK computing departments and understand the ethical issues involved in ICT research so as to develop such ethical framework that will provide a frame of reference for UK researchers in ICT. The main research question discussed in this paper is;

- What ethics review procedures currently exist in ICT research in the UK?

This question is meant to provide the empirical grounding for further research into questions like:

- What is ICT and what relationship exist between ICT and ethics?
- What is ethics review and why is it necessary in ICT research?

The overall aim of the project is to develop theoretically sound and empirically valid recommendations for ethics review in ICT research.

In this paper, based on the empirical findings of a UK-wide survey, the importance of ethics reviews in ICT research in underlined. An analysis of a survey on the current ethics procedures in UK computing departments is presented followed by its limitations and suggestions on future research.

2. IMPORTANCE OF ETHICS REVIEWS IN ICT RESEARCH

Many scholars including Moor (1985), Tavani (2006), Bynum, (2006) and Stahl (2004) have noted the importance of ethics in ICT. In different ways, these scholars have explored the role of ethics in the use of ICT artefacts. Not many have talked about ethics during research in ICT, thus leaving a conceptual vacuum in their strong arguments for ethics. Part of incorporating ethics into this area should however, start with the research into ICT. It is crucial therefore, that researchers in ICT carry out their research ethically. An ethical review of the work of ICT researchers is one possible way of achieving this position.
Here, ICT is defined as the production and usage of artefacts that can store, retrieve, manipulate, transmit and receive information electronically in a digital form. It includes personal computers, network hardware and software, satellite systems digital television, radio, robots. It is differentiated from Information Technology (IT) which concentrates more on the production of the artefacts alone and also Information System (IS) that finds meaning in organizations which usually refers to businesses. It represents a technological convergence that emphasises equally the production and the usage of the artefacts.

The emergence of increasingly unpredictable, uncertain and unquantifiable benefits and risks associated with ICT research indicates the need to establish a procedure that will critically reflect on the ethical, social and sometimes environmental implications of both the development and usage of ICT. A procedure that will embed ethical considerations in ICT by discussing the needs

and goals of the society and then serving as a framework to guide research towards these goals. That procedure is called ethics reviews.

Ethics review is an integral part of research ethics that promotes the adherence to ethical norms in research so as to maintain the aims of research such as knowledge, truth, avoidance of error and harm. Ethics reviews are processes set up by research institutions to find out if ethical norms are being adhered to during research. This process understands the ethical norms involved in the research, discovers both actual and potential ethical problems associated with the research and makes certain these norms are adhered to and the problems get effective solutions. Owing to the dynamic nature of ethical problems, ethics review should be based on a process that operates both before, during and after the research- whether it is in medicine, social science, psychology or ICT. This helps in developing a guideline that makes research effective.

The principles of the World Medical Association (WMA) declaration of Helsinki of 1964 (WMA, 2004) are always highlighted as established principles on which research ethics arguments are based on. Such disciplines as biotechnology, pharmaceuticals, psychology and social sciences have adopted these principles and extensively use them in their ethics reviews. This declaration proposed certain fundamental ethical principles for research that involve human subjects which include;

The principles of beneficence and of non-malfeasance- that the researcher ought to do good and avoid both physical and psychological harm to the research subjects.

The principle of autonomy- that every individual has the capacity for self-determination. This implies that such an individual should be free from coercion in decision making and others should respect his/her decision, protect his privacy and maintain his confidentiality. In research therefore, informed consent points to an individual's autonomy.

The principle of equality and justice- that every human individual has rights to be treated equally as others are and also the right to a just and fair treatment. Discriminations in research should be avoided.

The principle of integrity and best action- that the best actions should be employed in research so that the well-being of the human person will be taken into account.

Ethics reviews ensure that these principles are realised in research. The above principles provide support for arguments on ethical issues related to ICT such as privacy, intellectual property rights, trans-humanism, autonomy, cybercrime and other issues relating to research in general like voluntary participation and informed consent. These issues and other ethical issues related to ICT research have continued to get little attention from computer scientists before, during and after research is conducted owing to lack of ethics review procedures.

3. A SURVEY ON THE CURRENT ETHICS REVIEW PROCEDURES IN UK COMPUTING DEPARTMENTS

The Centre for Computing and Social Responsibility (CCSR) De Montfort University, Leicester, supported by the Higher Education Academy of UK has carried out a survey to investigate the current state of the art in ethics reviews of

Information and Communications Technology research across the UK. An analysis of this survey is presented in this paper.

This survey was designed to help understand the current state of the art in the ethical reviews of ICT research projects in the UK, identify the ethical problems research in ICT raise in the UK, identify the challenges ethical reviews of ICT research face in the UK, and ultimately provide information on how to build a practical and effective framework for ethics reviews of ICT research. The research technique used for this survey was questionnaire. It was an empirical research that made use of the qualitative data collection strategy of survey- questionnaire. The data collected was however of both quantitative and qualitative in nature, thus requiring the use of qualitative as well as quantitative data analysis.

The findings of this survey point to the fact that there is a need to establish an acceptable ethics review framework in ICT research. While some respondents do not see the need for ethics reviews in ICT research, there is a considerable agreement among the respondents that ethics reviews are relevant in the development of good research practices in ICT. Issue by issue these findings will be analysed followed by the limitations of this survey and suggestions for further research.

The questions were developed on the basis of an extensive literature survey on research ethics and computer ethics. The aim was to ask questions that would allow respondents to give clear answers that would allow the researchers to understand current procedures and resulting issues. The questionnaire was pre-tested on several PhD students and members of staff of the participating institution to ensure consistency and understandability. The main survey questions are summarised in Appendix A. Below is a summary of the most important findings.

3.1 Relevance of ethical reviews in ICT research

96.7% of the respondents agreed that ethics reviews are relevant in ICT research projects while only 3.3% disagreed. The arguments of the 96.7% who believe in the relevance of ethics reviews in ICT research include the facts that; it is the university policy, it maintains professional standards and finally that many of these projects involve human subjects and therefore raises sensitive ethical problems.

3.2 Availability of Ethics review boards or other means of reviewing the ethical content of research in ICT in UK universities

83.3% of the respondents indicated the existence of ethics review boards or other ways of reviewing the ethical content of research projects in their computing faculties/departments. About 6.7% indicated that no such board exists in their institution while 13.3% do not know if such boards exist. 23.3% of these respondents are members of such boards in their institutions while 76.7% are not. Descriptions of the ethics review procedures offered by this 23.3% show that it generally involves filling of forms and gaining approval from the board. One of the responses indicated that this procedure is still based on the ethical principles for conducting research with human subjects promoted by the British Psychology Society. Notably, these responses do not indicate any

follow up procedure during and after the research but on a positive side offers credence to the fact that ethics reviews are understood as relevant in ICT research projects.

3.3 Clarity of ethical review policies to affected Individuals (staff, researchers and students)

Even though the majority of respondents indicated the existence of ethics review boards and policies in their institutions, the most important question is, are these policies clear to all affected individuals including staff, researchers and students? From the responses, only 56.7% thinks that it is clear while 33.3% thinks the opposite. Is this because the procedure only reviews selected projects? To answer this, 36.7% indicated that their procedure reviews all projects, 40.0% said theirs reviews not all but specific projects while 20.0% answered 'do not know'. Another issue identified here that can make the procedure unclear is whether it distinguishes between different levels of research; undergraduate, graduate and research carried out by staff. 56.7% answered yes that it does distinguish, 23.3% said no, it doesn't while 16.7% answered do not know. All these indicate that there is a problem of clarity encountered by some affected ICT researchers with regards to ethics review procedures.

3.4 Problems and challenges raised by ethical review policies in UK Universities

Asked if the ethical review procedure of their institution face any problems or challenges, the respondents raised various issues that warrant serious attention. While some maintain that their procedures are generally accepted and well balanced, many point out that the forms involved make ethics seem like a box-ticking exercise. The latter group believe that many researchers consider it an additional and insignificant hurdle to pass and therefore they tend to see it as an obstacle to research. Mostly the respondents indicated lack of awareness of ethical issues as the reason for this perception. Other challenges to this procedure raised by the respondents include lack of a technique to follow up the outcome of the research, time constraint and audit issues, volume of work, the sheer number of the projects, especially of undergraduate projects and lack of seriousness exhibited towards the procedure by researchers.

3.5 What can be changed about ethics review policies in UK Universities

Respondents were asked to describe how they can change the existing ethics review policies in their institutions if given the chance. Responses to this question point to the fact that while a little percentage of the respondents is happy with the existing set-up, many feel dissatisfied. For those who are dissatisfied, the major change should be the simplification of the procedure either by cutting down the number of forms to be completed or by substituting the forms with a statement regarding the ethical implications.

Other interesting suggestions offered by the respondents include the ethical review of **all** ICT research projects and not some specific projects, the introduction of ethics training for Head of departments, improvement of publicity in ethics review issues, introduction of an ethics review process that is

interactive and not just a box-ticking exercise- that should be ongoing with the research and through to the outcome of the research and finally raising awareness among project co-ordinators, supervisors and students.

3.6 Should every UK computing department establish an ethics review procedure?

This question was designed to discover the acceptability of ethics review procedures in computing departments in Universities. Figures show that 86.7% of the respondents answered yes to this while 13.3% do not want to see computing departments establish an ethics review procedure. Findings suggest that many of those who make this recommendation do so because they consider it as part of the best practice in ICT and academic work in general

Of the vast majority of the respondents who said yes, the general belief is that research in ICT have an impact on the society and increasingly involve human subjects, therefore, ethics review procedures in universities are necessary both for ethical reasons and for legal reasons. They believe that computer scientists are generally concerned with the technical efficiency of their projects, that they sometimes forget the human implications. These procedures would help to raise that awareness and hopefully lead to better practice. It would also give both staff and students a good appreciation of the responsibilities of researchers to the society. Given these responses, one can conclude that majority of computer scientists would like to see an effective ethical review procedures established in their departments which is not the case at the moment.

4. CONCLUSION

4.1 Limitations of this Survey

345 respondents from different academic backgrounds in 97 UK computing departments were contacted for this survey but only 30 participants from 28 universities responded. These figures indicate that all of them, except for one PhD student, are in the group of those who work closely with Ethics review boards or are senior researchers in their departments. Therefore, one can level a self-selection bias argument on the findings of this survey. Those who handle minor research in the department such as undergraduate students, Masters students and Ph.D students were not well represented.

However, the fact that many of these minor researchers such as PhD students contacted for this survey did not care to respond might be an indication that they are little aware of this issue or care less about it.

4.2 Future Research

The findings of this survey suggest the lack of an established effective framework for ethical reviews of ICT projects in UK universities. Nevertheless, there are a number of universities who have adopted ethical guidelines, such as that published by the British Psychology Society, which helps in the review of their projects.

This paper suggests a future research on how to reconcile the differences in the existing ethics review policies in computing departments in UK in order to establish a unified ethical guideline for ICT research in the UK and also on how to develop an effective framework for ethics reviews. Other future research suggestions include how can UK computing departments provide an academic environment that encourages ethical research by promoting integrity and best practices? What are the benefits of regular ethics training for both staff and students- to raise both old and novel ethical issues in computing science?

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